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A MONOGRAPH

OF THE

BRITISH

PHYTOPHAGOUS HYMENOPTERA.

(TENTHREDO, SIREX AND CYNIPS, *Linné.*)

VOL. III.

BY

PETER CAMERON.

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PREFACE.

In this volume I have described the remaining three families of the Tenthredinidæ, the Cephidæ, Siricidæ, Oryssidæ, and the parasitic Cynipidæ. The fourth (and concluding) volume will deal with the inquiline and gall-making Cynipidæ, and will also contain such additions and corrections as increased knowledge may have brought to light during the period the book has been in course of publication.

It only remains for me to thank my correspondents for their continued kindness in assisting me with my work.

Sale, Cheshire;
April, 1890.

A MONOGRAPH

OF THE

BRITISH

PHYTOPHAGOUS HYMENOPTERA.

VOL. III.

TENTHREDINIDÆ.

Tribe CIMBICINA.

Antennæ 6—8-jointed, short, the third joint much longer than the rest, the last, the last two, or the last three forming a well-defined club, which is clearly separated from the preceding joints. Wings with two radial and three cubital cellules; the first cubital receives both or only one of the recurrent nervures (*Amasis*). Transverse basal nervure received considerably before the stigma; the transverse median is usually received very near to, or is quite joined to it. Posterior wings with two median cellules. The accessory nervure is continued to the edge of the wings, and is united to the anal by a short transverse nervure. Head broad and swollen behind, much narrower in front, so that the eyes are generally placed more in front than at the sides; the eyes are small and oval as a rule. Pronotum with a semicircular emargination on its hind border. Episternum of mesothorax large, and separated from the mesosternum by a deep groove, which is directed rather to the front than very obliquely downwards. Prosternum large. Abdomen broad, rounded behind, its sides acute, the back arched, the ventral surface flat, or semi-concave. Mandibles large, deeply 2- or 3-dentate. Saw scarcely, if at all, projecting, broad, the apex curved, round, and the sides bear little dentated bead-like projectings. Patellæ well developed; spurs often membranous at apex.

The clypeus is either moderately large and the labium small, as in *Cimbex*, or it may be small and the latter larger and moveable, as in *Clavellaria*. The mandibles are large, especially in the males of *Trichio-*

soma and *Clavellaria*. In the larger species (*Cimbex*, *Trichiosoma*, *Clavellaria*) the eyes are small, and are placed well in front, so that the head projects considerably behind them; in the smaller species (*Abia*, *Amasis*, and the Brazilian genera *Pachylosticta* and *Plagiocera*) they are longer and reach nearer to the base of the mandibles, while it is only in *Abia* and *Zarœa* that the head projects behind them. The other genera have them situated on the side. In the males of *Abia* they become nearly confluent at the top of the head.

The thorax is broad and thick; the sides project so that they are somewhat broader than at the top, the mesopleuræ being slightly hollowed, and separated by a more or less clearly defined border from the sternal region. The pronotum is almost horizontal in front, and has the head closely pressed to it; it has a well-defined border above, and from this runs an oblique emargination towards the head, separating the somewhat projecting spiracular bearing part in front of the episternum from the upper portion. The form of the episternum of the mesothorax is characteristic through the deep groove which separates it from the mesosternum, as well as from not being so obliquely situated as in the other saw-flies.

The mesonotum rises gradually from the pronotum to the scutellum, which is broader than long, rounded at the top, is raised above the mesonotum, and laterally there runs from it to the tegulæ a well-marked ridge. In front there is a deep hollow, while behind the post-scutellum is almost obliterated, so that it (the scutellum) presses closely on the metathorax, which is raised and semicircular in front and slopes from above downwards, a deep groove being thus formed between it and the scutellum, the cenchri being placed on the edge of the ridge so formed.

The first cubital cellule is as long, if not longer, than the second. The stigma is linear, and in the European genera is not much differentiated from the costa, but in the Neotropical genus *Pachylosticta* it is broad,

long, and projecting. The transverse median nervure being either united to the transverse basal nervure, or received quite close to it, is a well-marked peculiarity of the family. So also is the structure of the accessory nervure in the posterior wings. In no other European sub-family does it run to the edge of the wings without being united directly to the anal nervure, nor with the other tribes is it united to the latter by a cross nervure.

The larvæ are twenty-two-footed, cylindrical in shape, usually greenish in colour, and dusted over (especially when young) with a white exudation. Over the spirales are situated orifices, from which are ejected, often to some distance, a greenish, acid liquid, which contains chlorophyll.

They are, with one exception (*Abia sericea*), so far as is known, attached to trees or bushes, and spin a double cocoon, either to the branch of the tree on which they fed, or in the earth. When they quit the cocoon they do not eat away the one end entirely, but leave it hanging by one side (see Vol. II, Plate XII, fig. 5) as a lid.

The tribe must be regarded as a Palæarctic and Nearctic one, many of the species, indeed, penetrating very far north (Siberia, Labrador, Hudson's Bay); but, as already mentioned, two genera are found in Brazil, and species of *Cimbex*, &c., occur in the West Indies (Hayti), South America (Brazil, Argentine Republic), and in the Old World in Japan and North India.

This tribe contains the largest and most bulky species of *Tenthredinidæ*. As above defined, it contains the Palæarctic and Nearctic genera *Cimbex*, *Trichiosoma*, *Praia*, *Clavellaria*, *Abia*, *Zaræa*, and *Amasis*, and the Neotropical genera *Pachylosticta* and *Plagiocera*. The Australian genus *Perga* is included in the sub-family by many authors; but while *Perga* has undoubtedly some affinity with the *Cimbicina*, it yet possesses sufficient distinguishing points to warrant

its being raised to sub-family rank. But whether it should form a family by itself or one along with *Syzgonia*, *Laboceras*, and *Cephalocera* (which have also been placed in the *Cimbicina*, or at any rate the two former), the fact of its having the radial cell appendiculated, there being also only one radial cellule, in its wanting the lanceolate cellule, and having the tibiæ spined, the form of the saw being likewise different, are sufficient grounds for ejecting both *Perga* and *Syzgonia* (this genus having also these peculiarities) from the *Cimbicina*. The American genera *Thulia* and *Acordulcera* are by some authors united to the *Cimbicina*, but they also may be excluded, as they have only one radial cellule.

That, however, the *Cimbicides* are more closely allied to *Perga* and *Syzgonia* than to the *Tenthredina*, there can, I think, be no doubt; this is shown by the similarity of the form of the antennæ and thorax and by the neuration, especially of the form of the accessory nervure in the posterior wings, which is nearly the same in the three groups, only in *Perga*, &c., the accessory nervure is apt to become obliterated entirely.

We may with Thomson divide the European species into two sub-tribes—the *Cimbicides* and *Abiides*. *Pachylosticta* and *Plagiocera* will form another sub-tribe allied to the latter rather than to the former.

Sub-tribe CIMBICIDES.

Body large (6—13 lines), hairy or pilose. Lanceolate cellule divided by a straight cross-nervure; first cubital cellule receiving both recurrent nervures. Mandibles large; head swollen at the sides, projecting beyond the eyes, which are small, parallel, and situated well in front. Calcaria short, thick, membranous at the apex. Patellæ well developed, somewhat membranous. Palpi short, thick, the last three joints stout, short.

The larvæ are well marked with coloured spots or markings, and are green or blue, or more rarely reddish.

They are usually dusted over with a white exudation and feed on willows, birch or alder.

Synopsis of Species.

1 (2) Blotch large; labrum small; clypeus incised, larger than labrum. *Cimbex.*
2 (1) Blotch absent; labrum large; clypeus smaller than it.
3 (4) Posterior coxæ widely separated; antennæ with five joints before the club; posterior femora toothed; labrum and clypeus black. *Trichiosoma.*
4 (3) Posterior coxæ continuous; antennæ with four joints before the club; posterior femora simple; labrum and clypeus white. *Clavellaria.*

Genus—CIMBEX.

Crabro, Geoff., Hist. Ins., ii, 261 (1762); Fourc., E. P., ii, 361, *nec* Fab., Auct.
Cimbex, Oliv., Enc. Méth. Ins., iv, 22 (1789).

Blotch large, wide. Clypeus with a very small emargination; labium small. Antennæ 6-jointed. Posterior coxæ widely separated, and without teeth; anterior more oval, closely continuous.

The antennæ are, I consider, six-jointed. The basal two joints are small, the third is nearly as long as the succeeding together, the fourth and fifth subequal. The club is without any trace of segmentation, or there may be one or even two strictures. Whether these actually represent joints I am not at all clear. In one or two specimens I have, the club has every appearance of being comprised of three joints; but, on the other hand (and I think more often than not), the club is usually quite homogeneous. If the club is to be regarded as comprised of three joints that would make the antennæ eight-jointed.

The lateral sutures on the vertex are broad and deep, and they extend round behind the ocelli, where, however, the suture is not so deep, especially in the middle. A short, broad, longitudinal suture runs from it to the ocellus, which is situated in a deep pit. A suture runs from the lateral ocelli to the antennæ. The front is thick and projects considerably from the

sides. The eyes are placed at the side of this projecting portion of the head.

The mandibles are large, and strongly built; the apical tooth is large, long, and sharp; there are two subapical teeth. The labium is very nearly equally lobed; the first joint of labial palpi is small, half the length of the second, and not much shorter than the fourth; third very nearly as long as the other three together. Joints one, two, and four of maxillary palpi are subequal in length; the third is as long as these three together, fifth longer than sixth, and nearly as long as the third.

The first radial cellule is longer than the second; they are long compared to the breadth. The transverse radial nervure is a little oblique. The first cubital cellule is long, narrow, of nearly equal width throughout, and longer than the second, which is considerably wider than it, especially at the apex. The third cellule is a little shorter, and wider than the second. The first recurrent nervure is received in the basal third of the cellule, and is bullated at the junction with the cubital. The second is received a very little in front of the first transverse cubital cellule, and is often interstitial. The transverse median nervure is interstitial or nearly so.

The legs are of moderate size. The tarsi are longer than the tibiæ. The patellæ are very well developed, and somewhat membranous. The metatarsus is short, but is longer than the second joint, the second, third, and fourth joints become gradually shorter, the fifth is longer than the basal; its claws are strong, curved, inflated at the base, and either simple, or with a blunt, ill-developed, subapical tooth. In the ♂ the coxæ are much larger, thicker, longer, and more widely separated; the metatarsus is covered with long hair on the underside, and the apex beneath is projected into a large, blunt tooth. On the inner side the coxæ are hollow, their sides project into a ridge, which on the posterior side and towards the apical third, curves

down in a round curve to the apex, forming a hollow with a blunt tooth at either end. The ridge on the other side is much less developed, and there is also a blunt ridge on the underside of the femora, which are much thickened. The anterior femora are of the normal size, and they are also grooved. The coxæ are not enlarged like the two posterior pairs.

The abdomen is a little longer than the head and thorax; the blotch is very wide, and extends nearly across the segment; the segments are nearly of equal size. The ninth does not project at all on the upper side. Backwards it does not extend beyond the eighth, the saw does not project beyond the apex of the abdomen.

The form of the saw and back piece is quite peculiar, being rounded and curved at the apex, not brought to a sharp point as with the other saw-flies, and they are further distinguished by having along the edge little projecting bead-like points.

The insects belonging to this genus are the largest of all the *Tenthredinidæ*. They are very variable in coloration, and this has led, on the one hand, to many so-called species being made out of the various forms, and, on the other, to all the forms being united into one species, as was done by Klug, who placed them together under the name of *C. variabilis*. The observations of Brischke, Zaddach, and Van Vollenhoven, however, have shown conclusively that there are at least four, if not five, good European species of *Cimbex*, *s. str.* Undoubtedly the most satisfactory way of discriminating the species is by rearing them from the larvæ. Failing this crucial test, it is not always an easy matter to separate the perfect forms. In colour they vary exceedingly; the thickness, texture, and colour of the hair vary; the form of the antennæ varies, especially in their comparative length and in the shape of the club; the position of the nervures fluctuates: thus the second recurrent nervure is found in the second cellule, in the third, and is interstitial in all the species.

One species (*C. sylvarum*) is usually distinguished by having a fuscous fascia in the first discoidal cellule, and the edges of the wings are also fuscous, while *usually C. lutea* is distinguished by its wings wanting entirely these fuscous clouds; but I have seen specimens of *sylvarum* with the wings completely hyaline, and of *lutea* with faint indications of the fuscous tint along the edge and at the discoidal cellule. I thought once (like Zaddach, *loc. cit.*, p. 243) that the form of the scutellum would give a good specific character, but soon found that this also varied, especially with bred specimens. Then the posterior coxæ and femora vary in length and thickness in the males. In some bred specimens I have examined they are not much longer or thicker than the middle pair, while with caught specimens (of nearly the same size) they are more than one half longer and thicker. Nor is the variation in the size of the coxæ and femora confined to bred examples. The males, too, vary very much in size. Thus I have one ♂ of *C. lutea* which is 17 lines in length; the posterior femora are 4 lines long, and nearly 2 lines broad in the middle; another is $8\frac{1}{2}$ lines long, and the hind femora $2\frac{1}{4}$ lines long.

Synopsis of Species.

1 (2) Clypeus and pronotum clear yellow, wings yellowish, the fore half fuscous throughout; mesonotum and base of abdomen punctured. *Humeralis.*

2 (1) Clypeus and pronotum reddish-yellow or black, wings not fuscous throughout in front; mesonotum not punctured.

3 (4) Thorax, femora, the base, sides in front, and lower side of abdomen, violaceous. ♂ Apex of abdomen black or dull brownish, and with a violet iridescence. *Connata.*

4 (3) Thorax, femora, and base of abdomen not violet.

5 (6) Pubescence on head, thorax and base of abdomen longish, black, or dark fuscous; wings with a fuscous fascia in the basal cellule, and a fuscous border at apex. Head and thorax rarely yellow. *Sylvarum.*

6 (5) Pubescence on head, thorax and base of abdomen woolly, close, thick, griseous, pale, or yellowish; wings not marked with fuscous; head, thorax, and abdomen for the greater part, yellow. *Lutea.*

1. Cimbex sylvarum.

Vol. II, Pl. V, fig. 1, ♀; 1 *a*, Head; 1 *b*, Antenna; 1 *c*, Tarsus. Vol. II, Pl. XII, fig. 3, Larva.

Tenthredo sylvarum, Fab., E. S., ii, 105, 4; Pz., F. G., Heft 88, pl. xvi.
Cimbex sylvarum, Fab., S. P., 16, 4; Voll., Tijd. Ent., xviii, 33, pl. iii.
Tenthredo femorata, Pz., l. c., Heft 26, pl. xx.
— *tristis*, Fab., Iter. Norw., 334; E. S., ii, 106, 7.
Cimbex tristis, Fab., S. P., 17, 7.
— *varians*, Leach, Z. M., iii, 105; Ste., Ill., vii, 6, 2.
— *europæa*, Leach, Z. M., iii, 105, 4.
— *femorata*, ♀, Fall., Acta Holm., 191, 3; Mon., 8, 2; Lep., Mon., 31, 83; F. Fr., Hym., 5, 7; Drewsen, Ann. Ent. Fr., iv, 169 (1835); Ste., Ill., vii, 6, 1.
— *variabilis*, var. *femorata*, Klug, Berl. Mag., 1, 78; Htg., Blattw., 6, 3.
— *biguetina*, Lep., Ann. Soc. Ent. Fr., ii, 455.
— *betulæ*, Br. and Zad., Schr., Ges. König., ii, 233 and 249, pl. ii, f. 1 (lar.).
— *fagi*, Br. and Zad., l. c., 233, 251.
— *lutea*, Thoms., Hym. Sc., i, 19, 1.
— *siberica*, Kirby, List of Hym., i, 4, pl. 1, f. 1, ♀, 387; pl. xvi, f. 3, ♂.

Black; antennæ and tarsi luteous, body covered with a black or fuscous, longish pubescence; wings hyaline, a blotch along the transverse basal nervure, and the outer margin fuscous.
Length 7—13½ lines.

Ab.—*a*. Black; antennæ and tarsi luteous (*tristis*).

b. Black; antennæ and tarsi luteous, the three or four middle segments of the abdomen red. ♀ and ♂ (*sylvarum*).

c. As in *b*, but abdomen entirely red ♂, rarely ♀.

d. Black; antennæ, tibiæ and tarsi luteous, the three or four middle segments for the greater part pallid testaceous, or more rarely the middle segments are entirely pale testaceous (*varians*, *biguetina*, Lep.).

e. The antennæ, the head, except the vertex, pronotum, the fore part of mesopleuræ, the middle lobes of mesonotum at the sides, scutellum, legs, and abdomen, reddish-yellow; wings yellowish; the pubescence is shorter and paler than usual.

This is the most variable and commonest of the

species of *Cimbex*. The variations in the coloration are very numerous in both sexes. Commencing with quite black specimens save the antennæ and tarsi, we meet with specimens having one yellow band on the abdomen, then with specimens with two or three bands, which lead into specimens with the middle of the abdomen entirely yellow, the tibiæ being also yellow, and from this we reach the extreme yellowish form described above as *Ab. e.* We find the same variations with the red banded forms.

The larva feeds on birch, and is found from July to September. Its head is pale yellow, granular, and with black eye-spots, the body is green, more or less yellowish at the skin folds and along the back, where there is a black stripe, which is bluish along the centre, and is widest towards the middle of the body, it being very narrow along either end. The skin is wrinkled, especially on the sides, which are beset with numerous white warts, particularly over the legs. The feet are white, with brownish claws ; the spiracles black, longer than broad, and broader below than above; they arise from a raised part of the skin.

When young the larva is greenish-white, dusted over with white powder. It wants the black dorsal stripe entirely.

Brischke and Zaddach (l. c., p. 237, pl. ii, fig. 2) describe and figure a larva which was found by Drewsen and by themselves on beech ; this is described as being the largest of all the *Cimbex* larvæ. The ground colour of the body is a beautiful bluish-green, the dorsal stripe is clear blue or violet ; the head is larger and more cubital than with *sylvarum*, and the white tubercles are smaller and more pointed. According to Brischke the characters presented by this larva are constant, and if that be so the chances are that it pertains to a good species; but unfortunately Drewsen and Brischke and Zaddach bred only males, which cannot be separated apparently from *C. sylvarum*, and like the males of that species would seem to be very

variable. The above-named German authors name the beech-feeding form *C. fagi*.

The following parasites have been reported to feed on the larvæ of *C. lutea* and *C. sylvarum* :—*Campoplex argentatus*, Rtz.; *C. holosericeus*, Rtz.; *C. pubescens*, Rtz.; *Cryptus cimbicis*, Rtz.; *C. incubitor*, Gr.; *Hemiteles dispar*, Rtz.; *Mesochorus cimbicis*, Rtz.; *M. splendidulus*, Gr.; *Mesoleptus rufus*, Gr.; *Paniscus glaucopterus*, L.; *P. testaceus*, Gr.; *Pezomachus cursitans*, Gr.; *Tryphon mesoxanthus*, Gr.; *T. rufus*, Gr.; *T. sorbi*, Sax.; *Monodontomerus obsoletus*, Fab.

The species is of universal distribution in Britain, the flies appearing in June.

Continental distribution: General in Europe, also in Siberia.

2. CIMBEX CONNATA.

Tenthredo connata, Schrank, Beitr. z. Naturg., 83 (1776).
Crabro maculatus, Fourc., E. P., ii, 361, 2.
Tenthredo montana, Pz., F. G., Heft 84, pl. xii.
— *femorata*, De Geer, Mém., ii, 2, 943.
Cimbex decemmaculata, Leach, Z. M., iii, 106; Curtis, B. E., i, pl. xli; Ste., Ill., vii, 7, 4.
— *ornata*, Lep., Mon., 28, 77; F. Fr., Hym., 4, pl. i, f. 2.
— *maculata*, Ste., Ill., vii, 8, 7.
— *connata*, Voll., Tijd. Ent., vii, 50, pls. i and ii; Br. and Zad., Schr. Ges. König., vi, 254, pl. ii, f. 6 (lar.); André, Species, i, 26; Cat., 1,* 2.
— *pallida*, Ste., Ill., vii, 7, 3, *teste* Kirby, List of Hym., i, 2.
— *violascens*, Thoms., Hym. Sc., i, 20, ♀.
— *Humboldtii*, Ratz., Först., Ins., iii, 135, 46.

Fuscous-violaceous; the head, pronotum, pleuræ, tibiæ, and tarsi, brownish-testaceous, coxæ and femora violaceous; abdomen bright luteous, the basal two segments entirely, the third broadly in the middle, apical segments at the sides, and the greater part of the ventral surface, violaceous. Antennæ luteous. Head, thorax, and base of abdomen covered with a griseous pubescence, which is darker on the metathorax. Wings hyaline, more or less spotted with fuscous at base, middle, and apex.

The ♂ is violet-black, the apex of abdomen dull fuscous, antennæ and tarsi luteous, tibiæ brownish; head, pronotum, and pleuræ dull brown. The wings are coloured as the ♀, but have a much more clearly defined steel-bluish-violet iridescence.

Length 10—12 lines.

With the darker specimens the thorax is almost entirely black, the tibiæ are also black or dark fuscous, and the middle of the abdomen on the back and along the sides is violaceous, as in *C. decemmaculata*, Leach; with the lighter aberrations the head, pleuræ, the breast in part, pronotum, and the edges of the lobes of the mesonotum are brownish-testaceous; the abdomen is only violaceous at the base, and on the seventh and eight segments at the sides; the legs too being brownish-testaceous, save the femora, which are always violaceous.

The distinctions between *connata* and *lutea* lie in the darker-coloured thorax and base of the abdomen in the former, which are always for the greater part fuscous, for the ground colour, and most distinctly violaceous, the same being the case with the coxæ, trochanters, and femora; the wings are darker at the median cellule and at the apex, while they have also a more distinctly marked violet iridescence. The pubescence on the thorax and base of abdomen is shorter and thinner, the spurs are longer and thinner; generally too it is a larger insect than *lutea*.

The larva is of a beautiful clear green colour. The head is also greenish, with black eye-spots. The dorsal stripe is bluish-black, with paler spots. It commences on the first segment, continues to the penultimate, and is of a uniform breadth throughout. On each side it is bordered by a yellowish line. Not far from this yellow line is a roundish black dot; the spiracles are also of this colour. On the sides are numerous white warts.

When young (*i. e.* before the first moult) the larva is uniformly clear green, the head shining, the spiracles black, and there are on each segment three small black spots, which form three rows of spots, the uppermost being on the head. It feeds on alder.

Campoplex argentatus, Rtz.; *C. holosericeus*, Rtz.; *Mesochorus splendidulus*, Gr., and *Paniscus glaucopterus*, L. are its parasites.

Rare in the south of England. Sussex, Windsor, Plymouth (Bignell).

Continental distribution: Sweden, Germany, Holland, France, Italy, Austria, Greece.

3. CIMBEX LUTEA.

Vol. II, Pl. XII, fig. 6, Larva after Vollenhoven, 5, Cocoon.

Tenthredo lutea,, Lin., S. N., i, 655, 2; F. Su., 388; De Geer, Mém., ii, pt. 2, 943; Don., Brit. Ins., vii, pl. ccxxiv.
— *femorata*, Lin., S. N., i, 555, 1; F. Su., 388.
Cimbex lutea, Pz., F. G., Heft 105, pl. xiv.
Crabro lunulatus, Fourc., Ent. Par., ii, 362.
— *annulatus*, Fourc., l. c.
Cimbex femorata, Voll., Tijd. Ent. (2), v, 64, pl. iii; Ent., No. 151, 3, 1876.
— *Griffinii*, Leach, Z. M., iii, 107; Ste., Ill., vii, 7, 5; Lep., Mon., 30, 80.
— *Schaefferi*, Lep., Mon., 26, 74; F. Fr., 3, pl. i, f. 1.
— *variabilis*, Klug, Berl. Mag., i, 72; Htg., Blattw., 63; Ratz., Forst., Ins., iii, 63, f. 10, ♀.
— *luteola*, Lep., Mon., 28, 78.
— *saliceti*, Br. and Zad., Schr. Ges. König., iii, 251, pl. ii, f. 3.
— *brevispina*, Thoms., Hym. Sc., i, 21, 3.

Luteous; head and thorax darker coloured than the abdomen and legs, covered with a close, silky, white or yellowish pubescence. Wings pellucid, sometimes with a yellowish tint.

The ♂ is covered with a longer pubescence than the ♀, and is fuscous or blackish in colour.

Length 7—15 lines.

Ab.—*a*. Dull luteous; the mesonotum, sternum, head, and legs, brownish-testaceous; the edges of the abdominal segments marked with black. ♂ darker coloured all over, and the base of abdomen broadly fuscous-black. The wings in both sexes have a yellowish tinge.

b. The breast, the greater part of mesonotum, base of abdomen, and femora above, black. Abdomen pale luteous, the segments at base black. ♀

c. Thorax fuscous, the ground colour, however, being dull testaceous; basal half of abdomen black, apex

pale testaceous, femora broadly marked with black above. ♀

d. Black; antennæ for the greater part and tarsi reddish-luteous; wings clear hyaline. ♂

e. Yellowish-testaceous; the head, breast, back of thorax, and base of abdomen, fuscous.

The luteous forms of *lutea* are readily separated from the normal forms of *sylvarum*, which have always the head, thorax, and the greater part of the legs bluish-black; but the lighter-coloured aberrations of *sylvarum* come very near the darker-coloured specimens of *lutea*. These, however, may be always separated from *sylvarum* by the pubescence, which in the former is thick, moderately long, and alway griseous, pale or yellowish, never fuscous as in *sylvarum*, which has it somewhat longer, but not so close. The hair on the abdomen in *sylvarum* is also longer, more scattered, and not so silky as in *lutea*. The wings in *lutea* are more yellowish, and there is no fuscous cloud in the median cellule, nor has the apex a fuscous border.

The reddish-banded males of *sylvarum* are easily separated from those of *lutea*, which have always the abdomen black, except with *Ab. a;* but that again has sufficient distinctive characters in the colour of the head, thorax, and wings. The only characters that I can find to separate the black males of *sylvarum* from *lutea* are, that the median cellule of the former has a fuscous cloud, and the apex of the wings is always fuscous, and the club of the antennæ is shorter and thicker, being not much longer than the two preceding joints; in *lutea* they are not so distinctly pyriform, and are considerably longer than the two preceding. The wings in *lutea* ♂ appear to have a well-marked steel-blue iridescence, but I do not know if this is a constant characteristic.

The larva feeds usually on *Salix alba* and *S. fragilis*. Its body is bluish-green, the skin is in folds, and over the legs and along the sides are small white tubercles. Along the back is a dark bluish, central stripe, which

usually commences on the second body segment, and gets very narrow towards the tail. This stripe is darker at the folds, so that it appears to be made up of lighter squares separated by darker transverse bars. The head is of a pale greenish or greyish-yellow. The spiracles are black, lighter in the centre, and expanded on the lower side. The legs are pale green, with darker claws.

When young the larva is greenish-white, and, unlike the young of *sylvarum*, has a small, short dorsal stripe.

Besides the larva described above, Brischke (l. c., p. 239) found others feeding on *Salix aurita*, which Zaddach and himself refer to *C. lutea*, notwithstanding that they differed considerably from the *Salix alba* feeding form. The ground colour of the body with these goat willow-feeding larvæ is ochre-yellow, orange, or reddish, and marked with yellowish transverse stripes as well as with greenish-yellow spots. The head is ochre-yellow or reddish. The dorsal stripe is violet and, as in the normal form, is divided into clear spaces. The arrangement and form of the white tubercles and stigmas is the same as in the ordinary type. When young these larvæ are clear bluish-green, reddish-yellow on the back, the head is white, and the dorsal stripe is small and dark blue.

These larvæ eject the acid liquid from the lateral pores much more copiously than the others, and they are very difficult to rear, Brischke having only succeeded in rearing two males and one female during fifteen years. One of the males was identical with the black-coloured male of *lutea*, the two other specimens differed from any form of *lutea* seen by Zaddach, both being much paler coloured than usual; but whether they represented merely extreme varieties of *lutea* or distinct species is a question which cannot be decided from the limited information at hand. If they truly belong to *lutea* it is certainly a most remarkable case of dimorphism in the larvæ. The pale-coloured pair bred by Brischke are to be referred to the var. *pallens*.

I have one British specimen which agrees pretty closely with it, but the ground colour is darker.

The form from *Salix alba* has been shown by Brischke (Schr. Natur. Ges., Danzig, vii) to be parthenogenetic, but he did not rear the larvæ.

Not common. Perthshire, South of England.

Continental distribution: Sweden, Germany, Holland, France, Italy.

4. CIMBEX HUMERALIS.

Crabro humeralis, Fourc., E. P., ii, 361.
Tenthredo connata, de Vill., Linn. Ent., iii, 84, 13.
— *axillaris*, Jur., Hym., 48, pl. 6, f. 1.
Cimbex axillaris, Pz., F. G., Heft 81, pl. vi; Klug, Berl. Mag., i, 84; Htg., Blattw., 68, 2; Spin., Ins. Lig., ii, 152, 5; Voll., Tijd. Ent., v, 49, pl. i, Zool., s.s. 9263.
— *humeralis*, Lep., Mon., 30, 81; Ste., Ill., vii, 8, 8; André, Species, i, 24; Cat. 1*, 1.
— *scapularis*, Stein, S. E. Z., xxxvii, 53 (1876).

Black; antennæ yellowish, the club more or less fuscous; clypeus and pronotum clear yellow; the mandibles, labrum, sides and vertex of head, pleuræ, scutellum, and legs, yellowish-testaceous; abdomen clear yellow; the basal two segments, the third in the middle, the fourth, except at the sides, the edges of the following segments, and a small triangular mark in the centre, black. Head and thorax covered with a pale fuscous, longish pubescence; mesonotum, pleuræ, and base of abdomen punctured. Wings yellowish, the fore half fuscous, nervures testaceous; the second recurrent nervure not interstitial.
Length 7—8 lines.

As with the other species, *humeralis* exhibits a certain amount of variation in coloration, but it is very small in comparison with that shown by *sylvarum* and *lutea*.

The larva of this species feeds on hawthorn and on *Prunus padus*. The body is bluish-white, somewhat yellowish at the sides. On the back is a broad, bluish central stripe, divided as usual into clear and darker spaces alternately. On either side of this stripe is a line of small, transverse, black and orange spots. On each segment are: a little wedge-shaped black line, close against it an orange spot, broadest above, after

this are one or two longer black lines, then a smaller one, and, lastly, three of nearly equal size, all black. The last segment has three black spots in the centre, and on either side one orange and three black lines. Stigmata black. Legs white, with black claws; at the end of the penultimate joint is a long black stripe; the claspers are greenish-white.

It appears in early summer, and becomes full-fed in July.

As parasites there have been recorded: *Mesochorus cimbicis*, Ratz., *Mesochorus splendidulus*, Gr., and *Paniscus glaucopterus*, L.

Rare. Salisbury (Leach).

Continental distribution: Germany, Austria, Holland, France, Pyrenees.

Genus—TRICHIOSOMA.

Trichiosoma, Leach, Z. M., iii, 108 (1817).

Blotch absent. Labrum large, clypeus with a distinct emargination. Posterior femora large, long, toothed beneath. Coxæ widely separated; anterior coxæ slightly apart. Body covered with long hairs.

The neuration and the form of the antennæ agree with *Cimbex*, as does also the form of the head. The clypeus is much smaller, the labium is much larger, and it projects considerably. The mandibles are large, and have two blunt teeth in the middle; they are much larger and gaping with the ♂. The labium has three equal lobes, and is rather short and thick. With the labial palpi the second joint is the longest, the first the smallest, and the third is longer than the fourth. The maxilla is long and narrow, its inner lobe is shorter than the outer. The basal four joints of maxillary palpi are thicker than apical. Joint one is a little longer than second, the third is as long as the basal two together, fourth a little shorter than the fifth; the sixth is the longest.

On the underside the femora are grooved, and bear a blunt tooth on either side at the apex of the groove, but the inner tooth is very slightly developed; and this is pretty much the case with both in many females. At the apex of the coxæ beneath there is a saddle-like depression, with a tooth at either end as in *Cimbex*. The metatarsus has a curved depression on the underside covered with hair as in *Cimbex*, but there is no distinct spine at the apex as in that genus. The calcaria have a membranous lobe at the apex; the claws are simple. As with *Cimbex*, the males have the legs very much more developed than the females.

The scutellum is flatter and longer than in *Cimbex*, and at the base it projects forwards a little, so that the depression at its base has a slight curve.

The larvæ are green, and when young are covered over with a white powder. In form they agree quite with those of *Cimbex*. One species feeds on birch, another on *Sorbus aucuparia*, one on willows, and another on hawthorn.

Trichiosoma agrees very closely with *Cimbex*, and by many authors the two are not considered generically distinct. I certainly think the genus is a natural one, and is sufficiently distinguished from *Cimbex* by the blotch being absent, by the larger size of the labrum compared to the clypeus, by the femora bearing teeth, and by the body being covered with long hair.

The genus is not so widely distributed as *Cimbex*, and it contains fewer species. Four European species are known, and three from North America. Possibly one or two of the latter may not be distinct from the Old World forms.

Considerable variation is shown by the species, and as the specific distinctions between them at the best are not great, they are not always easily separated, unless they have been bred, the larvæ here, as in many other cases, affording the best criterion of specific distinctness.

Synopsis of Species.

1 (2) Tibiæ fuscous. *Betuleti.*
2 (1) Tibiæ testaceous or yellowish.
3 (4) Femora clothed with black hairs, distinctly violaceous; abdomen clothed at base with yellowish hairs, with short fuscous hair at the middle, and with long yellowish or greyish hair at apex. *Scalesii.*
4 (3) Femora clothed with pale hair.
5 (6) Abdomen dull black, covered uniformly with long grey hairs, the apex and sides of abdomen sometimes reddish; the tibiæ not darker than the tarsi. *Lucorum.*
6 (5) Abdomen bronzy black, the hair on base longer than on middle or apex; the apex, sides, and belly usually ferruginous, rarely black; tarsi paler than tibiæ. *Vitellinæ.*

1. Trichiosoma vitellinæ.

Vol. I, Pl. X, figs. 14 and 15, Larva.

Tenthredo vitellinæ, Lin., F. Su., 386.
Trichiosoma laterale, Leach, Z. M., iii, 109; Curt., B. E., i, pl. xlix; Ste., Ill., vii, 9, 2.
Cimbex vitellinæ, Br. and Zad., Schr. Ges. König., iii, 259, Taf. iii, f. 1 (lar.).
Trichiosoma salicis, Htg., S. E. Z., i, 19.
— *vitellinæ*, Thoms., Hym. Sc., i, 24, 3; Cam., Proc. N. H. S. Glas., iii, 205 (lar.), Fauna, 46, 2; André, Species, i, 28; Cat., 3,* 4.
Tenthredo amerinæ, De Geer, Mém., ii, 2, 948, 3 (non L.).

Black, somewhat bronzy; tibiæ reddish-testaceous, tarsi testaceous, wings yellowish, the apical margin of the wings fuscous, costa testaceous, stigma bluish-black; the apex of abdomen, the sides, and more or less of the belly, ferruginous. The hair on the head is black or fuscous; on thorax and abdomen pallid or yellowish. It is thick and long on the base of the abdomen, but becomes shorter and thinner towards the apex, where it is silky.
Length 7—12 lines.

Ab.—Abdomen quite black. ♀ and ♂.

The amount of reddish colour on the abdomen varies considerably; sometimes the apical third above, the sides and the belly from base to apex are reddish, sometimes only the sides and apex, and more rarely the reddish colour is entirely absent. The latter is the case with all the specimens (♀ and ♂) I have bred from the larvæ figured on Pl. X, Vol. I, figs. 14 and 15) these specimens being also much smaller (7 lines only) and more shining than usual. In the ♂ the hair on

the thorax and abdomen is usually more reddish or yellowish in tint compared to the ♀. The middle of the antennæ is generally testaceous; seldom is it entirely black.

This is the largest species in the genus, although very small specimens are also met with. As a rule, the reddish colour of the sides, apex, and lower side of the abdomen readily separates it from *lucorum*, but as this is not a constant character, and as the same colour occurs with *lucorum*, the most reliable point of distinction lies in the abdomen of *vitellinæ* being much more shining and bronzy than that of *lucorum*, besides which the hair on the middle and apex is much shorter, the colour of the hair on the thorax and abdomen having also a redder tinge.

The larva has the head white, with a fuscous mark on the apex, not touching the black eye-spots; the lower part of the clypeus is black in the centre. The body is light green, the folds of the skin whitish; along each side of the dorsal vessel is a row of white tubercles, and there is another row over the legs; the dorsal vessel itself is pale green. The spiracles are dark reddish, and over each is one or more small reddish marks. The anal segment is clear of tubercles. Legs clear white, claws blackish.

The above is the description of the larvæ I find in Scotland feeding in August and September on *Salix aurita* and *S. caprea*. Brischke (l. c.) bred the species from two different larvæ. One he found in August and September on *Salix caprea*. Its body was clear yellowish-green beset with numerous white tubercles; the head shining, yellowish, granular in texture, and with black-eye spots; the spiracles elliptical, reddish, the claws brown. The other form he found in July on *Salix viminalis* and *S. caprea*, and was smaller than the autumnal one. The ground colour was bluish-green, the dorsal line (which was free from white warts) of a darker green, and the whole body (except the last segment) beset with raised, often confluent, tubercles and

dots. The spiracles were reddish-brown, and over each (except the first and last) was a small dot of the same colour, which is not found on the other larva. The claws were brown, and upon the yellow shining head was, between the eyes, a brownish spot.

The only variation in coloration I have noticed was in some specimens which had the green of a bluish tinge. As with the other species, the young larvæ are dusted all over with a white powder.

Seemingly not very common in England and Scotland, but is widely distributed.

Continental distribution: Sweden, Germany, France.

America: Vancouver's Island and the Rocky Mountains (Kirby, List of Hymen., i, p. 10).

2. Trichiosoma Scalesii.

Vol. II, Pl. V, fig. 2, ♂; 2 *a*, Hind Leg; 2 *b*, Head of ♂; 2 *c*, Antenna; 2 *d* and *e*, Trophi of Fly; 2 *f*, *g*, *h*, Trophi of Larva. Vol. II, Pl. XII, 2, 2 *a*, Larva (after Brischke).

Trichiosoma scalesii, Leach, Z. M., iii, 111; Kirby, List of Hym., i, 9, pl. 1, f. 8; Ste., Ill., vii, 10, 6.

— *sorbi*, Htg., S. E. Z., i, 19; Ratz., Forst., Ins., iii, 136; Thoms., Hym. Sc., i, 23; Cam., Proc. N. H. S. Glas., iii, 205 (lar.); Fauna, 46, 4; André, Species, i, 27; Cat., 2,* 3.

Cimbex sorbi, Br. and Zad., Schr. Ges. König., iii, 261, pl. 11, f. 8—10.

Black; tibiæ and tarsi reddish-yellow; wings yellowish, the apical margin fuscous. The hair on the face and sides of the head black, on the vertex yellowish. The hair on the thorax and base of the abdomen also yellowish, more rarely greyish; on the middle of the abdomen it is fuscous or black; on the apical three segments it is yellowish or yellowish-grey, and it is much longer than at the base or middle. The femora are violaceous and clothed with black hairs. The antennæ are shorter than in the other species.

The ♂ has the apex of the abdomen reddish.

Length 6—8 lines.

The black hair on the violet-coloured femora easily separates this rare species from *vitellinæ*. It is also much smaller, and the hair on the abdomen is diffe-

rently distributed and coloured, it being long and reddish at the base, short and fuscous in the middle, and longer and yellowish at the apex, while in *vitellinæ* the colour is uniform, and scarcely longer at the apex than at the middle.

The larva feeds on *Sorbus* (or *Pyrus*) *aucuparia* in August and September. Its head is small, ochreous-yellow, granular; on the vertex are two reddish marks, which are frequently almost, if not quite, united. Mouth brownish, mandibles blackish. Body yellowish-green; the skin beset with numerous tubercles, which are white, but may have a yellowish tinge, and are much larger over the legs and along the dorsal vessel than over the rest of the body; there are none on the anal segments. Legs white, with dark brown claws. the ventral legs are glassy green. Spiracles elliptical, pinkish-red. The clypeus and the part immediately over it whitish, without the ochreous colour.

When young it is whitish-green with white tubercles, the skin thickly powdered; the head is pale ochreous-yellow.

Tryphon sorbi, Saxs., and *Mesoleius rufus*, Gr., are its parasite.

The species, according to von Siebold, is parthenogenetic.

Not common. Darenth and Coombe Woods (Stephens), Lake District (King), Braemar, Glen Lyon.

Continental distribution: Sweden, Germany.

3. TRICHIOSOMA LUCORUM.

Vol. I, Plate X, figs. 5 and 5 *a*, Ovipositor; fig. 8, Coxa and Trochanter. Vol. II, Pl. XI, figs. 10 and 10 *a*—*d*, Larva.

Tenthredo lucorum, Lin., S. N., i, 555, 4; F. Su., 389.
Trichiosoma sylvaticum, Leach, Z. M., iii, 108; Ste., Ill., vii, 9, 1.
— *Latreillii*, Leach, l. c., 110; Ste., Ill., vii, 9, 3.
— *unidentatum*, Leach, l. c., 111; Ste., l. c., 10, 7.
— *pusillum*, Ste., Ill., vii, 11, 8.

Trichiosoma biverrucatum, Ste., l. c., 11, 9.
Tenthredo vitellinæ, Don., Brit. Ins., iii, pl. lxxxviii, f. 3.
Trichiosoma lucorum, Thoms., Hym. Sc., i, 23, 2; Cam., Fauna, 46, 1; André, Species, i, 27; Cat., 2,* 1.
Cimbex lucorum, Htg., Blattw., 68; Br. and Zad., Schr. Ges. König., iii, 257; Voll., Tijd. Ent., xi, 197, pl. viii; Ent., No. 138, 8, 1875.
— *lateralis*, Voll., Tijd. Ent., vi, 65, pl. iv.

Bronzy-black; the thorax of a deeper black than the abdomen, which has a metallic gloss; knees, tibiæ, and tarsi yellow to yellowish-testaceous; wings somewhat yellowish, a fuscous border round the apical margin; costa and basal nervures testaceous, stigma bluish-black; the nervures beyond the transverse median nervure are black. The hair is long and thick over all the body; on the head it is black; on the thorax and abdomen greyish, sometimes changing to yellowish; the hair on the femora is also grey. The latter are blue; the middle of the antennæ is sometimes dull testaceous.
Length 6—10 lines.

Ab. Apex of abdomen above, at the sides, and more or less of the ventral surface, reddish. ♀ and ♂.

The long grey hair, nearly uniformly spread over the thorax and abdomen, readily distinguishes this common species.

The larva, when young, has a greyish-white body, the head blackish or fuscous, and obscured with a white exudation; the body is dusted all over with a white powder, which obscures the colour beneath.

When full-fed, the head is light brownish-yellow, the mouth parts brownish, eye-spots black. Across the vertex is a large dark brownish mark, which occupies the greater part of it and extends down the face. The legs are white, claws black, claspers light glassy-green; the elliptical spiracles are dark brownish-black. The body is bright, rarely bluish-green; the skin is wrinkled and beset with white tubercles over the legs and along the back; in the former region there is one large tubercle with a smaller one beneath; the anal segment is free from tubercles. There can scarcely be said to be a dorsal stripe, but when the food canal is filled, it is noticeable as a slightly darker green line.

It feeds on birch during July, August, and September.

Campoplex pubescens, Rtz., *Cryptus cimbicis*, Tschek,

Mesoleius rufus, Gr., have been recorded as parasites.

The species is parthenogenetic, the virgin eggs producing males.

Common in June, especially in Scotland.

Continental distribution: Sweden, Germany, Holland, France, Russia.

4. TRICHIOSOMA BETULETI.

Vol. II, Pl. XII, figs. 1—1 *a* and *b*, Larva.

Cimbex betuleti, Klug., Jahrb., 225; Voll., Tijd. Ent., ii, 64, pl. iii.
Trichiosoma tibiale, Ste., Ill., vii, 10.
— *lucorum*, West., Gard. Chron., 1852, 68; Thoms., Hym. Sc., var. *betuleti*, i, 24.
Cimbex cratægi, Br. and Zad., Schr. Ges. König., iii, 263.
Trichiosoma betuleti, Cam., Proc. N. H. S. Glas., iii, 207; Fauna, 46, 3; André, Species, i, 27; Cat., 2,* 2.

Black; tarsi yellowish, tibiæ fuscous; head, thorax, and abdomen covered densely with reddish-yellow hairs. Abdomen from the basal third covered uniformly with black, sometimes pale, hairs, which are shorter than those on the base and thorax.
Length 6—9 lines.

Apart from the fuscous-coloured tibiæ, which separates it readily from the three other British species, *betuleti* differs from *lucorum* (of which it is considered a variety by Thomson) by the reddish hair on the thorax and abdomen, and by the latter being not uniformly covered with hair of the same length.

The larva, when young, is green, but this colour is usually hid by the white exudation; the head black, also covered by a white powder. The oral region is white.

When old the larva is bright greenish-yellow, with a darker green line running down the back. The head is yellowish, with a large brownish-orange mark on the vertex. The legs pale whitish-green, with brown claws; the spiracles reddish. The skin is covered with minute warts (much smaller than the tubercles found on the other species), and is sparsely covered over with a white powder.

It feeds on the hawthorn (*Cratægus oxyacantha*) during July and August.

Cryptus cimbicis, Tschek, *Tryphon sorbi*, Saxs., and *Monodontomerus obsoletus*, Fab., are parasites of the larvæ. Commonly distributed.

Continental distribution: Sweden, Germany, Holland, France.

Genus—CLAVELLARIA.

Clavellaria (p.), Oliv., Enc. Méth., Ins. iv, 22; Leach, Z. M., iii, 111 (1817).

Posterior coxæ placed close together. Labrum large, apex rounded. Antennæ with only four joints preceding the club. Blotch absent. Claws simple.

The third joint of the antennæ is longer than the succeeding two, the fourth as long as the basal two together. The club has no trace of segmentation in any of the specimens I have seen. The clypeus is slightly emarginated, and is more than half as long as the labrum, which has its edges projecting outwardly, so that it is somewhat hollow. The mandibles are long, and where they meet the tips leave an open space between them and the labrum. The sutures on the vertex are as in *Cimbex*. The frontal area is hollow.

The inner lobe of the maxilla is rounded at the top, the sharper-pointed outer one reaches to within one third of the length of inner lobe from the top. The lower half of the maxilla is provided with longish hairs on the outer side; the cardo is as long as the stipes, and is darker than it. Palpi short. The basal three joints are thicker than the others; joint two is a little longer than third, which again is longer than the fourth; the fourth and fifth are subequal, the sixth a little longer than the second. Labium longish, the lobes equal in length. Palpi short; the first joint is small, second and third longer and subequal, the fourth is the longest.

The neuration of the wings does not differ much

from that found in *Cimbex* and *Trichiosoma*, save that the second recurrent nervure is received at a greater distance from the first transverse cubital.

Clavellaria contains only one species. It comes nearest to *Trichiosoma*, but its body is longer and narrower, the abdomen especially being longer compared to the length of the head and thorax. The wings are shorter compared to the length of the body; the mandibles are longer and more projecting, the legs are more slenderly built and have no teeth. The tarsi are shorter compared to the tibiæ, and their patellæ are much less strongly developed. The antennæ have one joint less before the club, there being only the fourth joint between it and the third, while it has no divisions.

1. Clavellaria amerinæ.

Vol. II, Pl. V, fig. 3, ♀; 3 *a*, Head; 3 *b*, Antenna; 3 *c*, Labium. 3 *d*, Maxilla. Vol. II, Pl. XII, fig. 4, Cocoon.

Tenthredo amerinæ, L., S. N., i, 555, 3; Fab., S. P., 16, 5; Fall., Mon., 10, 4; Lep., Mon., 35, 97; Htg., Blattw., 71, 5.

♀ — *quadrifasciata*, De Geer, Mém., Ins., iii, 508, pl. xxx, f. 20; Retz., Gen. Sp. Ins., 71.

— *rufa*, Retz., Gen. Sp. Ins., 71.

♀ — *marginata*, Lin., S. N., i, 920, 2; Pz., F. G., Heft 17, pl. xiv; Fab., S. P., 16, 6; Pz., F. G., Heft 14; Lep., Mon., 36, 98.

Clavellaria amerinæ, Ste., Ill., vii, 12, 1; Thoms., Hym. Sc., i, 25, 1; André, Species, i, 28; Cat., 3,* 1.

— *marginata*, Curt., B.E., ii, pl. xciii; Ste., Ill., vii, 12, 2.

Cimbex amerinæ, Voll., Tijd. Ent., iii, 104, pl. viii; Zool. (s. s.), 1789.

Black; head, thorax, and base of abdomen covered with long pale hairs; labrum and clypeus white, the club of antennæ red; knees, tibiæ, and tarsi, reddish-testaceous; the belly, the edge of basal segment of abdomen, the fourth at the side above, and a broad band on the hinder part of the remaining segments, yellowish-white; wings yellowish-hyaline, the basal cellule and the apex obscure fuscous; costa, stigma, and nervures testaceous.

The ♂ wants the yellow fasciæ on the abdomen, of which only the apex and ventral surface are of that colour; the tibiæ are for the greater part black.

Length 8—10 lines

The eggs are laid on the leaves of *Salix fragilis*, &c., attached to the veins according to van Vollenhoven, on the edge according to Brischke. The larvæ are more slender-bodied than with *Cimbex* or *Trichiosoma*. The thorax is thicker than the abdomen, which decreases gradually towards the tail. The head is green, the eye-spots black; the body is bluish-green or dirty greyish-green. The skin is wrinkled; each segment is divided into seven folds. There are no warts, but the body is sparsely strewed with a white powder. The spiracles are black, triangular; the legs green, with black claws.

In confinement, at least, the cocoon is peculiar, the outer cocoon being loose in texture, like network, and white in colour. Zaddach says that when it is spun in the earth it is oblong, but when it is spun in the folds of bark, the usual place where it is spun, its sides are strongly compressed. See Vol. II, Plate XII, fig. 4.

Brischke found the larvæ on poplars besides willows.

Campoplex pubescens, Rtz.; *C. amerinæ*, Rondani; *Cryptus leucocheirus*, Rtz.; *Mesochorus cimbicis*, Rtz.; *M. testaceus*, Gr., are parasites of the larvæ.

Not common. Windsor (Stephens).

Continental distribution: Sweden, Holland, Germany, Greece, Russia, Algeria.

Sub-tribe.—ABIIDES.

Body moderate (3—4 lines). Lanceolate cellule constricted in the middle; first cubital cellule receiving both or only first recurrent nervure.

The head is less swollen than in the *Cimbicides*, and the eyes are slightly emarginated on the inner side. The mandibles are smaller, not so strongly toothed. The last three joints of the maxillary palpi are much more elongated and thinner.

The sub-tribe contains two or, according to others, three genera. The disputed genus is *Zaræa*. It was

separated from *Abia* through the club being only two-jointed, and a further character was afforded by the white band at the base of the abdomen. I have not adopted *Zaræa*, because, in the first place, the club in *A. nigricornis* and in *A. fasciata* tends to become inarticulate in isolated specimens; and secondly, in *Abia* proper the club is apt to become, and in some specimens actually is, only biarticulate.

The Neotropical genera *Pachylosticta* and *Plagiocera* are intermediate in some respect between the two European genera, but differ from both in other respects. They agree with *Amasis* in the structure of the antennæ, and in the first and second cubital cellules receiving each a recurrent nervure, but they both differ from it in the eyes not converging on the inner side and in the divisions of the body (the separation of the clypeus from the front, the lobes of the mesonotum, &c.) being clearly indicated. From *Abia* they differ in the manner in which the recurrent nervures are received, in the eyes being situated at the sides of the head, which is not swollen behind them, in the tarsi having the patellæ but slightly developed, and the calcaria are acute, not membranous. From both they differ in the basal joint of the antennæ being double the length of the second, and in the transverse basal nervure being almost joined to the cubital. The middle lobe of the mesonotum is triangular at the apex, not rounded as in *Abia*.

Synopsis of Genera.

1 (2) First cubital cellule receiving both recurrent nervures. Eyes diverging on inner side, confluent on top in ♂. Antennæ 6—7-jointed. Sutures on head and thorax distinct. *Abia*.

2 (1) First cubital cellule receiving only one recurrent nervure. Eyes converging on inner side, not confluent in ♂. Antennæ 5-jointed; mesonotal sutures obsolete. *Amasis*.

Genus—ABIA.

Abia, Leach, Z. M., iii, 113 (1817).
Zaræa, Leach, l. c.

Antennæ clavate, shorter than the thorax, 7-jointed, the club 3-jointed; basal two joints small, third the longest, nearly as long as the fourth and fifth together, thin at base, slightly thickened towards the apex, and a little curved on lower side; the fourth is nearly of the same size as the fifth, but is thinner, and is clearly separated from the fifth, while that is distinctly separated from the club, the apical two joints of which are closely amalgamated; the last is obtuse, and is smaller than the sixth in the ♀, but is larger in the ♂. Wings with two radial and three cubital nervures. The first radial is wider and shorter than the second; the first cubital is about one half longer than second and much narrower; the third is double the length of second. The first cubital cellule receives both the recurrent nervures. Round the upper edge of the second radial cellule is a surrounding nervure, which forms at the apex of the cellule a small appendicular cellule. The lanceolate cellule is largely contracted in the middle. The transverse median cellule is nearly united to the transverse basal. In the posterior wings are two median cellules. Eyes diverging on the inner side; in the ♂ almost confluent on the top.

The vertex is broadly depressed in the centre. The lower ocellus is separated from the others by a deep groove, which forms a sharp triangular depression behind it. The front between the antennæ is wide; in the centre is a groove, and there is a less distinct transverse one in the middle, which divides it into an upper and a lower less projecting division. Over the clypeus is a deep curved groove. The clypeus is truncated at the apex and projects in the centre. The labrum is smooth, less rugged in texture, pitted with small round depressions and semicircular at the apex. The mandibles are stout, slightly curved, covered with long hair on the outer side, and with a large apical tooth and two irregular subapical ones. The inner lobe of maxilla is broadly rounded at the top; the outer is broad at base, sharp at the apex, and reaches close to the top of the inner. The maxillary palpi are short and thick, the basal two joints are of nearly equal length, but the first is much broader than the second, the third is a little longer than the preceding two, the fourth a little shorter than the third, and is a little

thickened towards the apex; the last two are the longest, and are of nearly equal length. The apical three joints are thinner than the basal three. The labium is formed of three nearly equal lobes. The first and second joints of labial palpi are nearly equal in length, but the second is thicker than the first, the third is longer and thicker than any of the others, the fourth is a little shorter than the third.

The legs are of moderate size and thickness; the spurs are thick, three-fourths of the length of metatarsus; the patellæ are large, thick, and curved at the apex. Claws bifid, rarely simple. The abdominal segments are convex, of nearly equal length; on the centre of the basal two is a more or less clearly defined keel. The saw is of the same structure and shape as in the *Cimbicides*.

In the ♂ the eyes are larger and nearly joined at the top. They are further distinguished by having on the back of the abdomen a quadrate spot which is depressed and slightly pilose in *A. sericea* and raised and velvety in texture in *nigricornis*.

Synopsis of Species.

1 (2) The club 3-jointed, thick, the joints distinctly separated; the fourth joint not much more than half the length of the third, distinctly thicker than it, and shorter than the fifth; antennæ yellowish. The basal two abdominal segments keeled (the abdominal segments uniformly punctured) = *Abia*, sensu str. *Sericea.*

2 (1) The club 2- or indistinctly 3-jointed, elongate; the fourth joint more than twice the length of the third; first thicker than it, and longer than the fifth. The second abdominal segment not, or but indistinctly, keeled.

3 (4) The antennæ yellowish in the middle; the claws bifid. The abdominal segments punctured and opaque only at the base, the apex impunctate and shining. *Candens.*

4 (3) The antennæ entirely black, the claws simple.

5 (4) Fourth joint of antennæ dilated in ♂. Carina on base of abdomen distinct; base of abdomen black in ♀. Fascia in wings irregular, not extending across. *Nigricornis.*

6 (5) Fourth joint of antennæ not dilated. Carina on base of abdomen indistinct; base of abdomen white in ♀. The fascia in wings broad, extending right across. *Fasciata.*

1. Abia sericea.

Vol. II, Pl. V, fig. 5, Abdomen of ♂ ; 5 *a*, Head of ♂; 5 *b*, Antennæ; 5 *c* and *d*, Trophi; 5 *e*, Head of ♀. Vol. II, Pl. XI, fig. 9, Larva.

Tenthredo nitens, Lin., L. N., i, 556, 7; F. Su., 389.
— *sericea*, L., l. c., 921, 8; Pz., F. G., Heft 17, pl. xvi.
Cimbex sericea, Klug, Berl. Mag., i, 92, 8; Htg., Blattw., 73, 8.
Abia sericea, Ste., Ill., vii, 14, 2; Br. and Zad., Schr. Ges. König., iii, 273; Cam., E. M. M., xii, 111 (1875).
— *nitens*, Thoms., Hym. Sc., i, 27, 1.
— *dorsalis*, Costa, F. N., Cimb., 5, pl. lxi, f. 1.

Antennæ shorter than thorax, testaceous, often blackish or fuscous-black at base of apex. Head much narrower than mesothorax, dark brassy-green, finely punctured, and covered with long black hair. Labrum and palpi dark testaceous. Thorax brassy-green; mesonotum and pleuræ cœrulescent; metanotum with a coppery tinge, covered with a long black pubescence, and very finely and closely punctured. Cenchri small, narrow, pale white. Abdomen bright brassy-green, the upper side coppery, irregularly punctured, the segments in ridges, convex; basal segments smooth, shining; the apical closely covered with a griseous pubescence. The anal (ninth) segment is incised in the middle, acute; the sheath of saw projects, testaceous; the edges of the ventral segments are pale. Legs: coxæ, trochanters, and femora coppery-black; knees, tibiæ, and tarsi straw-yellow. Wings yellowish hyaline; nervures, costa, and stigma luteous; the nervures are black at the base; below the stigma is a smoky fascia, situated between its middle and the transverse basal nervure; there is a less clearly defined fascia at the apex, partly in the second radial, partly in the third cubital, cellule. The tarsi have a ferruginous tinge.

The ♂ differs in having on the fourth to the seventh abdominal segments, in the centre above, a quadrate depression, which is covered with a black velvety pubescence; its apex is a little narrower than the base. The first segment has a fine raised ridge in the centre. The puncturing is close, the general coloration is not so bright, and, if any thing, the pubescence on head and thorax is longer. The anal appendages are testaceous.

Length 4½—5¾ lines.

Abia brevicornis, Leach (*splendida*, Kl.), is smaller than *sericea*. The antennæ and mouth are testaceous, the femora are entirely yellow, the wings are not so yellowish, and the fasciæ are fainter and narrower; the tegulæ are yellow behind, and the abdomen, and to some extent the mesonotum, have a decided bluish tinge. In the ♂ the quadrate spot is rusty-brown

coloured, and the eyes are more widely separated, and with a depression between; the puncturing is not so close, and the abdomen wants the sericeous pubescence. It is found in Central Europe.

Abia fulgens, André (*Aurulenta*, Zad., *non* Sichel), from Switzerland and North Italy, differs from *sericea* in having the abdominal segments only on the hinder border somewhat arched, regularly punctured throughout, and covered with reddish-grey hairs. The labium is black, and the stigma is black at the base, while the antennæ are black at base and apex.

The larva feeds from July to October on *Scabiosa succisa*. When full-fed the head is rather small. Compared to the second segment, the colour of it is black, the mouth parts paler, and it is covered with short whitish hairs. The upper part of the body is dark greyish slate, and marked as follows: In the centre of the back is a row of twelve black marks; joined to these outwardly is a row of twelve orange marks, and touching these again, but placed more towards the end of the body, is a row of larger black marks, while between each pair of the last-mentioned black marks is a small black dot. The lower half of the sides is white, as are also the legs and claspers. Over each of these are two black marks, one over the other. The skin is rather downy and in furrows, and on each segment are two rows of white tubercles. The spiracles are brownish. The last segment is paler than the rest of the body.

When young the markings are scarcely, if at all, visible. The leaves are eaten at the edges, and when feeding the larva presses the head close to the feet, and the abdomen is kept curled round. When alarmed they drop to the ground, ejecting as they do so an acid liquid from the lateral pores, and when they touch the ground roll themselves up into a ball and remain motionless. The double cocoon is spun in the earth.

The species is parthenogenetic, the unfertilised eggs producing males.

Commonly distributed, appearing in June.

Continental distribution: Sweden, Germany, France, Switzerland, Italy, Russia.

2. Abia candens.

Abia candens, Konow, Rev. d'Ent., vi (1887), pp. 2 and 123.

Metallic-green, running into blue or coppery tints, especially on the mesothorax and scutellum, shining; the knees and tibiæ white, the tarsi reddish or brownish-red; the antennæ, with the basal two joints and the basal two-thirds or so of the third, black; the apex of the club blackish, the base fuscous; wings hyaline, with a yellowish tinge; a broad brownish cloud below the stigma, and another occupying the greater part of the radial cellule. The fourth antennal joint is hardly one-third of the length of the third, and its apex hardly thicker than the apex of the third, and distinctly longer than the fifth; the club with the three joints moderately distinctly indicated; its basal joint longer than either of the others. Head, with the occiput and vertex, sparsely punctured; the front, cheeks, and clypeus much more closely and rugosely; the labrum rufous; mesonotum sparsely, scutellum coarsely, punctured. Abdomen shining; the segments moderately convex, the base finely punctured, the apex impunctate; the apical segments sericeous; the last rufous at the apex. Sheath of ovipositor longish, rufous. Claws bifid.

The ♂ has a velvety patch in the centre of the abdomen as in *sericea*.

Length 4½—5¾ lines.

The general coloration and facies are quite identical, except as regards the antennæ, even if in that, with *sericea*, and it forms a transition between *Abia*, sensu str. and *Zaræa*. The distinctions between the two lie in (1) the form of the antennæ, in (2) their colour, and (3) in the abdominal segments in *sericea* being uniformly punctured and almost opaque and more convex, while in *candens* only the base is punctured, the apical half being quite smooth and shining and impunctate, at least in the ♀, for in the ♂ they are uniformly punctured.

I am somewhat doubtful as to the specific validity of what I have called *candens* and *sericea*. While the difference in the antennæ between the typical forms is well marked, yet the intermediate forms lead up so closely to the extremes as to make a clear line of demarcation very difficult to draw, *e.g.* the relative

lengths and thickness of the antennal joints vary, especially in the club and in the length and thickness of the fourth joint compared to the third. The colour of the antennæ in typical *sericea* varies, the base and apex being not infrequently blackish. I can also distinguish variations in the sculpture of the abdomen in specimens which have the typical *sericea* antennæ. I fancy that the distinctness of the joints of the club depends on the development of the individual. Generally in *candens* the second abdominal segment wants the central keel, but in some individuals it is indicated, although not so strongly as in typical *sericea*.

The two forms occur together in Scotland, and are equally common. This fact would appear to militate somewhat against the specific distinctness of *candens* and *sericea*. Unfortunately I have not retained any of the specimens bred from the larvæ I have described and figured under *sericea*. I have also south of England examples. I may add that I have Scotch specimens which are in every respect identical with examples named by Dr. Puton from the Vosges.

Konow records *candens* from Switzerland and Westphalia.

3. Abia nigricornis.

Abia nigricornis, Leach, Z. M., iii, 113, 1; Curt., B. E., ii, pl. lxxxix (1825); Zadd., Schr. Ges. König., iii, 270.
Cimbex ænea, Klug, Berl. Mag., i, 91, 7.
Abia (*Cimbex*) *ænea*, Voll., Tijd. Ent., i, 144, pl. v; Zool., s.s. 7523.
— *bifida*, Thoms., Hym. Sc., i, 28.
— *loniceræ*, Kirby, List of Hym., i, 14, 6.

Antennæ black; basal joint almost globular, transverse, thicker; second narrower, shorter, distinctly transverse; third slightly curved, thickened at apex, four times longer than the two first; fourth dilated in the middle, shorter and thicker than preceding; fifth shorter, considerably thicker, and apparently biarticulate. Head small, densely covered with a long, fuscous pubescence, much narrower than the thorax, rounded in front, truncated behind; brassy-black; apex of mandibles fuscous. Eyes widely separated, oblong-oval; labrum transverse, pilose. Thorax obscure brassy-black, a little shining; mesonotum

finely punctured; scutellum transverse at base, distinctly punctured. The pronotum is clearly separated from the mesonotum, slightly ridged behind, densely covered with a fuscous pubescence; metanotum coppery, scarcely pubescent. Cenchri white. Abdomen brassy green; nearly one-fourth longer than the head and thorax, dilated at the sides, wider than the thorax, minutely punctured, and covered with a velvety pile; the apex and sides pilose. Ventral surface black, shining, not brassy; the segments pale at their junction. Legs: coxæ, trochanters, and femora, brassy-black; tibiæ and tarsi yellow, tarsi darker; claws bifid. Wings sub-hyaline, with a yellowish tinge; there are three fuscous fasciæ; a long, narrow, slanting stripe, a small one below the stigma, and one at the apex in the radial cellule; costa and stigma luteous, the latter fuscous at the base.

In the ♂ the fuscous markings on the wings are deeper and broader; the abdomen is, if anything, greener, and has a quadrate velvety spot on the fourth, fifth, and sixth segments, and there is a faint raised keel in its centre. The silky hairs on the abdomen are whitish, while in the ♀ they are more yellowish, and the abdomen has a more metallic gloss.

Length 4½–5½ lines.

The larva has been described by Van Vollenhoven. Its head is black on the crown, and grey on the oral region. On the body the back is purplish-grey, and is divided in its entire length by two orange-coloured lines of equal width; the sides and legs are grey. Between the orange lines are twelve large purplish spots; between each pair of these are two smaller spots, and there are some smaller spots on either side. Spiracles elliptical, brownish. When young the larva is grey, powdered over, as it were, with white; there are two yellow spots on each dorsal segment in place of the orange stripes which appear later. There are four spots on the sides and on the centre of the back.

The pupa has the anterior part of the body brownish-yellow, abdomen green, with broad brownish stripes on the back. Antennæ white, legs yellowish-white, eyes brownish.

It feeds on the snow-berry (*Symphoricarpus racemosus*) in June and July, and pupates in the earth.

Exetastes cimbicis, Voll., is a parasite.

Not common; London district; Jersey.

Continental distribution: Sweden, Lapland, Holland, Switzerland, France, Italy, Germany, Russia.

4. Abia fasciata.

Vol. I, Pl. X, figs. 3 and 9, Trophi; Vol. II, Pl. V, fig. 4, ♀ ; 4 *a*, ♂ ; 4 *b*, Antenna; Vol. II, Pl. XIII, fig. 1, Larva; 1 *a*, *b*, and *c*, Trophi of larva.

Tenthredo fasciata, Lin., S. N., i, 555, 5; F. Su., 389; Pz., F. G., Heft 17, pl. xv.
Cimbex fasciata, Lep., Mon., 36, 99; Dbm., Isis, 1837, p. 76; Prod., 59; Fall. Acta Holm., 1807, 194-6.
Zaræa fasciata, Curt., B. E., ii, pl. xcvii (1825); Ste., Ill., vii, 12, 7; Htg., Blattw., 726; J. A. Osborne, E. M. M., xix, 97; xx, 145 and 205.
Abia fasciata, Br. and Zad., Schr. Ges. König., iii, 268; Thom., Hym. Sc., i, 30, 1; André, Species, i, 31; Brischke, Beob. ü. Blattw. (2), 123, pl. viii, f. 7.

Brassy-black; head and thorax densely covered with a longish fuscous pubescence. Abdomen smooth, shining, pubescent at apex and sides, obscurely punctured; knees, tibiæ, and tarsi obscure testaceous, the tarsi lighter in tint; apex of mesothorax and of first abdominal segment white. Wings hyaline, with a large transverse fuscous fascia in the middle; apex faintly infuscated.
Length 5—6 lines.

With the females I have noticed the following aberrations:

a. Apical joints of antennæ blackish beneath.
b. Metathorax entirely black.

The ♂ is exceedingly rare, only some half-dozen specimens having been hitherto recorded, and there can be no doubt, from Dr. Osborne's experiments, that the species is normally parthenogenetic. From larvæ gathered outside Dr. Osborne bred flies which, without any connection with males, laid fertile eggs abundantly, all of which hatched out and yielded flies the following year. These again laid eggs, but much less freely, and from these were obtained a third generation of flies, which also laid a few eggs, none of which, however, developed. This infertility in the third generation is probably owing to the artificial conditions in which they had been reared, rather than to a diminution in their powers of parthenogenetic reproduction.

The ♂ wants the white band on the metathorax. The eyes almost unite above, there is a bushy tuft of long hair on the front, the colour of the abdomen is more obscure, wanting the brassy tinge, except at the apex, which is shining. The apical segment has a furrow in the middle on the apical half; the band in the wing is somewhat less, and the apex is clear hyaline.

Zaddach (*l. c.*) says the ♂ has a quadrate black spot on the fourth to seventh segment as in *Abia*, but this is not the case.

Not having had an opportunity of observing the habits of the insects and their larvæ myself, I give Dr. Osborne's excellent description of their economy, quoting his remarks almost *verbatim*. The eggs are laid singly in mines formed beneath the upper epidermis of the leaf, and, being inserted at the edge of the leaf, form a sort of beading round its circumference. In oviposition the fly sits on the edge of the leaf, holding it firm with the spines on the posterior tibiæ, and it also uses the hinder angles of the valves of the saw to hold the leaf steady at the very point where the extremity of the saw is to be first introduced. The ovipositor being inserted under the epidermis is first thrust backwards, parallel with the edge of the leaf, to its full extent, and then swept round till it lies again under the edge of the leaf in front of the point of insertion, which is situated rather behind the middle of the mine; the saw all the time playing with short, quick strokes, which gives it somewhat the appearance of watchwork running down. The ovipositor is next brought back to a position midway in the mine and at right angles to the axis of the fly; and after a short delay the egg descends between the two blades with its long axis also at right angles to that of the fly. The egg is green in colour, and in shape crescentic, with the horns rounded off, while in the blades of the ovipositor the lowermost end (in advance) would correspond with what should be the posterior or caudal end,

the concave edge, looking forwards, with the ventral surface; supposing its parts to have the same relation to the eggs of other insects. But when the egg is escaping from the blades of the ovipositor it makes a turn of 90° in the mine, by which the first-laid end comes to look forwards (*i. e.* in the direction of the head of the fly), and the concave side to look upwards (*i. e.* in the direction of the back of the fly); and so the position of the egg comes to be exactly the reverse of what it would have been if simply extruded backwards in a line with the parent. Having withdrawn the ovipositor, the fly presses together the lips of the wound with the two valvular pieces between which the ovipositor lies when not in use, possibly having injected some glutinous liquid by means of which the aperture is obliterated. The mine is now a closed cavity, and, as the egg grows, shows like a little blister on the leaf. Generally no change whatever takes place in the parenchyma, but in a few instances Dr. Osborne observed a growth of rather large globular cells, bursting off the epidermis covering the egg, and indicating perhaps a transition to gall growth. . . . The mine is mostly beneath the upper surface, but instances are not infrequent in which it is found immediately under the lower cuticle.

In regard to the growth of the larva Dr. Osborne has furnished me with the following (unpublished) account, which, as being the only complete description of the development of any saw-fly larva is of much interest and value.

The eggs are laid, if the day is sunny and warm, immediately after the extrusion of the fly; that is provided it is supplied with a suitable leaf. It does not delay a moment for impregnation, and in the only instance Dr. Osborne had an opportunity of observing the behaviour of the ♀ towards the ♂, she seemed decidedly unwilling to have anything to do with him, and to prefer to accomplish her business altogether without his assistance. In *coitu* the ♂ is bent under

the larger ♀—his head reaching to about her middle legs. She is very restless, but he holds on and is not shaken off.

Hatching takes place in from two to three weeks, according to the season and temperature. The newly-hatched larva is from 4—4·5 mm. in length, tapering towards the tail; the colour dirty, transparent-darkish, with the remains of the green yolk shining through in the posterior part of the body. The head is at first pale brown, but becomes quite black in a few hours.

On 11th June Dr. Osborne placed thirty-four larvæ, which had hatched during the previous night, so as to watch them through their various moultings, and the following is an abstract of his observations on the growth of these larvæ:

June 12th, 5 p.m.—Head quite black, body more opaque, especially on the dorsal aspect, but the ardoisé bloom has not yet developed. One is 5 mm. long at rest.

June 13th, 7.55 a.m.—Some 6 mm. or more long, not much ardoisé bloom conspicuous yet, but beginning to appear under a lens.

June 14th, 7 a.m.—Ardoisé bloom pretty well developed on a few. Longest about 6·5 mm. at rest. . . . . 6.12 p.m., the bloom appears now to be fully developed on most.

June 15th, 7.30 a.m.—Nearly all with ardoisé bloom. No moult yet. Some measure 6·5—7 mm.

June 16th, 6.15 a.m.—Longest 8—8·5 mm. Full ardoisé bloom (coming off on brush), except in one or two. Figure still tapering from head to tail, but more cylindrical than at first.

June 18th, 7 a.m.—Length 7·5; 8, 9 mm. These are amongst the longest, there being others much smaller. Not much growth (in length) since yesterday; head now much smaller than second segment.

June 19th, 7.15 a.m.—Ardoisé bloom all gone; larva dirty, semi-transparent. Measure, some 8 mm.—the largest met with to-day. The step taken by the anal

proleg is 1½ mm. . . . . 1.55 p.m., first moult began, two or three (out of thirty-one) moulted or moulting. Found the length of one quite recently moulted to be 6·5—7 mm. Pace (with anal proleg) about 1½ mm.

June 20th, 6.30 a.m.—Twenty-one (out of thirty-one) have gone through first moult. The moulted have not yet become ardoisé; the others have lost the bloom for some time. There is no appearance of spots in the moulted. Any increase of size in these is rather in the knees than in length. Several of the unmoulted measure 8 mm., and none of the moulted exceed this length.

June 21st, 7.5 a.m.—All moulted but four. They have mostly recovered the ardoisé bloom, which at last covers the black head. One measures 9·5—10 mm., another only about 8 mm. There is no trace of spots yet.

June 22nd, 6.30 a.m.—Still one or two unmoulted. Length, one, 9 mm., crawling pace nearly 2 mm. with anal proleg. Another is 1 cm. long. On the other hand, I find one moulted no more than 5·5 or 6 mm.

June 23rd, 7.20 a.m.—Measure, 1 cm.—8·5 mm. Two still very small.

June 24th, 8 a.m.—Measure, one, 11—12 mm. The yellow lateral spots are distinct under the lens in all but one (which has never moulted). These colours are proper to the larva after the second moult, and are now shining through the old skin.

June 25th, 7.25 a.m.—Becoming de-ardoisé preparatory to the second moult. One measures about 11 mm., two others are 12—13 mm.; others, again, much smaller.

June 26th, 6.50 a.m.—Second moult well on; earlier moulted ones re-ardoisé; black spots very distinct. Great increase in breadth of head and anterior segments; body still tapering posteriorly. No increase in length—about 12 mm. in both moulted and unmoulted. Smaller ones measure about 10 or 9·5 mm.;

large, over 13 mm. Twenty-three (out of twenty-nine) have passed the second moult.

June 27th, 7 a.m.—Twenty-six have moulted. The black spots are now a good deal obscured by the ardoisé bloom. The large ones measure about 13 mm., or perhaps 12 at rest. Others are smaller—10 mm. They vary also in thickness.

June 28th, 7.30 a.m.—Twenty-seven moulted (two not). Measure, 13—14 mm.

June 29th, 6.50 a.m.—Length at rest, 13—16 mm.

June 30th, 7 a.m.—Twenty-eight have now moulted twice; last moulted 9—10 mm ; others 16·5, 13, 8·5 mm., the larger measurements not being extreme.

July 1st, 7.20 a.m.—The third moult now in progress since yesterday evening. Nine have moulted the third time (out of twenty-nine), distinguished by their brighter spots, yellow and black, and by their larger shining black heads, not yet obscured by the ardoisé bloom. They vary in length, 15—15·5 being the average. The unmoulted average at least an equal length. . . . . 7.15 p.m., ten more have passed the third moult.

July 2nd, 7 a.m.—Twenty-three (out of twenty-nine) have passed the third moult (five the second and one has only moulted once, if once?). Measurements, longest 16—17 mm., others 15—16 mm. or smaller.

July 3rd, 6.40 a.m.—Twenty-seven moulted. One of the longest measures close on 2 cm., others 18, 18, 18·5, 19, down to 14 or 15 mm.

July 4th.—Measurements, 16—20 mm.

July 5th, 12.40 p.m.—Twenty-seven passed third moult. One of the others dead. Largest measure 20—22 mm.

July 6th, 7.25 a.m.—Fourth moult commenced. Length 22—23 mm. down to 16 or 17.

July 7th, 7.45 a.m.—Eight (out of twenty-eight) passed fourth moult; 22—23 mm. long.

July 8th, 10.5 a.m.—Twenty-one passed fourth moult.

July 9th, 10.20 a.m.—Twenty-five moulted for fourth time, 22—25 mm. in length.

July 10th, 7.5 a.m.—Twenty-six moulted; longest $2\frac{1}{2}$—3 cm.

July 11th, 7.20 a.m.—Twenty-seven moulted; longest $2\frac{1}{2}$—3 cm.

July 12th, 7.55 a.m.—Greatest length at rest 3 cm. In one or two there are indications of that clearing of colour which precedes spinning up.

July 13th, 7.20 a.m.—Three cm. seems the very outside limit of length. At rest many are much smaller.

July 15th, 4.10 p.m.—Still feeding, and only one or two decidedly brightening before spinning up. Something of the characteristic bad smell. No appearance of mucous discharge. No increase in length in the largest.

July 16th, 6.45 a.m.—No spinning up yet, sluggish, Getting smaller (?). One decidedly clear coloured. The signs of approaching spinning up are:—The colour becoming clearer; general diminution in size; sluggishness; the insects lying curled up; bad smell; decrease of frass; mucous discharge. The latter is, with the characteristic mal-odour, a proximate sign.

July 17th, 7.50 a.m.—First cocoon.

July 18th.—Three more cocoons. Most are now clear coloured. Some mucous threads and cocoons begun. Spinning up of main body well now set in.

July 23rd.—Found twenty-three cocoons; only the little one has still to spin up.

August 5th.—The last cocoon made.

The full-grown larva has a black shining head, the colour lighter at the mouth, and it is covered with short hair. The body is shining greenish-grey, sometimes bluish along the back, and may even be yellowish in tint there. Above the stigmas are two rows of irregular black marks, and a row of similar marks goes down the centre of the back. Below the stigmas, above and a little in front of the second pair of legs, is a row of larger and much longer marks, which form

an almost continuous line scarcely separated between the segments. Below and touching these are eleven orange marks longer than broad, and, like the line above, commencing and ending on the second, and ending on the third last segment. The first two orange marks are traversed by the black ones. Over the claspers is an elongated black mark; in front of the first leg is a small black mark; the mark over the second and third somewhat obscure. Spiracles elliptical, bordered with brown. Claws brown. There are thus five rows in all of black spots; the space between the line over the orange spots and the third is greater than between the others.

Mesoleius sepulchralis, Holm., is a parasite on the larva (cf. Bridgman, E. M. M., xx, p. 228).

The cocoon is spun near the surface, amongst the leaves, &c. According to Dr. Osborne, larvæ which feed on snow-berry leaves alone form "dark brown, resinous-looking cocoons," while those which feed on honeysuckle make them much lighter in colour.

The flies are found chiefly in early summer, also in July; and in Scotland I have taken a ♀ late in August.

Local, but generally distributed in Scotland, England and Ireland.

Continental distribution: Sweden, Germany, Switzerland, France, Russia.

Genus—AMASIS.

Amasis, Leach, Z. M., iii, 114 (1817).

Antennæ 5-jointed, the third joint double the length of fourth, which is thicker than it; the single-jointed club is longer than the third and fourth together. Wings with two radial and three cubital cellules; the the first cubital cellule is a little longer than second, and the third is the longest and widest; the first and second receive each a recurrent nervure. Lanceolate cellule largely contracted. Transverse median nervure interstitial. Posterior wings with two median cellules. Eyes situated below the ocelli, large, reaching near to the base of mandibles, converging on inner side. Calcaria acute, not membranous at apex Patellæ small. Claws bifid.

The vertex is thick, slightly hollow in front of ocelli. Front broad. The antennæ widely separated. Clypeus sharply incised in the middle so that the two sides are semicircular. Labrum small. The mandibles are small, and have one small subapical tooth. The maxilla and labium are long. The middle lobe of the latter is a little longer than the others; the lower part is longer than the upper, broader at base than apex, and rounded to a point. The palpi are shorter than the lobes, the basal two joints are subequal, the third is longer, the fourth a little shorter than third. Maxilla long; inner lobe rounded on outer side, the outer lobe long, broad at base, sharp at apex, not reaching to apex of inner. The maxillæ arise somewhat down from the junction of the inner lobe with the stipes. The basal joint is short, second longer, a very little shorter than the third, and both it and the second are thicker than the following; the fourth is the longest and is slender, the fifth short and thick, the sixth thin, a little shorter than the fourth.

The most striking peculiarity of this genus is the manner in which the various divisions of the head and body are closely united so that nearly all trace of the divisional markings are obliterated. Thus the front and clypeus form one piece. The lobes of the mesonotum have their sutures obliterated, and the separation of the mesonotum and metanotum is scarcely distinguishable. The segments of the abdomen are also closely united, although the divisions are clearly indicated, and they are not arched as with the species of *Abia*. Very different too is the structure of the legs, which have the patellæ very slightly developed, neither are they membranous. The metatarsus is a little shorter than the following three joints; the last joint is long.

The body is closely punctured and has no metallic gloss as in *Abia*. The ♂ offers no secondary sexual difference from the ♀.

The larvæ are unknown.

The genus is of small extent, there being but few European and one South American species, but it is doubtful if the latter really belongs to *Amasis*. One species is known from North Africa and the Canaries.

The evidence of the British nativity of *Amasis* is hardly satisfactory. The records given by Stephens are distinct enough, but no examples have ever been found, so far as I am aware, beyond those recorded by Stephens. Both the species have a somewhat wide range, but, on the whole, they must be regarded as southern rather than northern insects, although one species (*obscura*) is found in Sweden. The late Mr. Frederick Smith, of the British Museum, it may be added, was not inclined to consider the genus British.

Synopsis of Species.

1 (2) Body and legs entirely black. *Obscura.*
2 (1) Abdomen more or less saffron-yellow; legs more or less white. *Crassicornis.*

1. Amasis crassicornis.

Vol. II, Pl. V, fig. 6, ♀; 6 *a*, Head; 6 *b*, Antenna; 6 *c*, Labium; 6 *d*, Maxilla.

Tenthredo crassicornis, Rossi, Fauna Etr., ii, 21, 704.
Cimbex sylvatica, Oliv., Enc. Méth., v, 772, 14.
Tenthredo læta, Fab., E. S. Supp., 214; Pz., F. G., Heft 62, pl. vi.
Cimbex læta, Lep., Mon., 39; F. Fr., pl. i, f. 6; Htg., Blattw., 74, 10.
— *jurinæ*, Lep., Mon., 38.
— *oliveiri*, Lep., l. c., 40.
Amasis jurinæ, Ste., Ill., vii, 15, 2.
— *læta*, Br. and Zad., Schr. Ges. König., iii, 275, 1; André, Species, i, 32; Cat., 4,* 1.

Black; punctured; head and thorax pilose; abdomen beneath, at the sides, and more or less above, saffron-yellow; apical half of femora testaceous; tibiæ, except at apex, and metatarsus, white or pale testaceous. Wings hyaline, slightly infuscated at the apex; costa and stigma black.
Length 3½ lines.

The abdomen appears to vary in colour considerably. In a specimen in Shuckard's collection (labelled "from British Collection, Brit. Mus.") it is saffron-yellow for the greater part. The basal segment is entirely black above; the second black except at sides; the black in the two following is as wide but becomes narrower at the apex. In the three following it does not extend to the apex at all, and the apical bears no black; the amount of black on the legs varies also.

"The only examples I have seen of this pretty species" are in the British Museum; they were taken near Bristol (Stephens, *l. c.*).

Nothing is known about the life-history of this species, but according to Jurine the flies frequent *Ranunculus bulbosus*.

Continental distribution: Germany, Switzerland, France, Austria, and especially in Italy and along the Mediterranean.

2. Amasis obscura.

Tenthredo obscura, Fab., S. E., 319, 9; Pz., F. G., Heft 84, pl. xiii.
Cimbex obscura, Fab., S. P., 18, 12; Lep., Mon., 39; Htg., Blattw., 74, 11.
— *italica*, Lep., l. c., 39.
Amasis obscura, Ste., Ill., vii, 14, 1; Thoms., Hym. Sc., i, 13, 1; Br. and Zad., Schr. Ges. König., iii, 277, 4; André, Species, i, 33; Cat., 4,* 5.

Black; head and thorax covered with a fuscous pubescence; abdomen silky. Wings hyaline, more or less infuscated towards the middle. Length 3½ lines.

"Said to have been found in Lincolnshire. The only specimens I have seen are in the British Museum" (Stephens, *l. c.*).

The distribution of *obscura* is wider and more northern than *crassicornis*, it being found in Scandinavia, Germany, France, Switzerland, Italy, and Russia.

Sub-family HYLOTOMINA.

Antennæ 3-jointed, prismatic, cylindrical or hollow at sides; two basal joints small, third large. Wings with one radial cellule, appendiculated or not, and three or four cubital cellules. Posterior wings sometimes appendiculated, with two middle cellules. Lanceolate cellule generally contracted. Larvæ with eighteen or twenty eggs.

The ocelli are varied, and there is a depression in front of them. From this depression the front raises to a more or less blunt point between and below the antennæ, reaching to near the mouth. On the top of this ridge (which is margined) and before the antennæ is reached, there is often a fovea, which has a more or less clearly defined margin, and is either triangular or pear-shaped, or at least is broader above than below. Clypeus truncated, or but slightly incised at apex. Head concave behind. Episternum of mesothorax oblique. Scutellum projecting over the metanotum, a groove between it and the metanotum. Abdomen with a distinct epipygium; the hypopygium is varied in form. Saws thick, broad, usually beset with cross-bars. Tarsi with minute patellæ. Tibiæ often spined, rarely without spurs (*Pachylota*). These when present are simple. Maxillary palpi 6-, labial 4-jointed; labium 3-lobed. Mandibles thick, short, without inner tooth.

Wings with one radial and three or four cubital cellules, the second or first and third receiving each a recurrent nervure. Costal cellule wide, with a distinct cross-nervure, transverse cubital nervure often dilated and curved. Transverse median cellule usually received in middle of cellule. When the lanceolate cellule is contracted the basal part of the accessory nervure is often very short and difficult to see. In the hind wing it is sometimes obsolete; when present it is, as a rule, appendiculated towards the middle.

In the ♂ the antennæ may be simple, and ciliated

or pilose, or the third joint may be cleft at the base into two equal branches.

This is a very distinct sub-family, the structure of the antennæ alone serving to distinguish it. The sub-family is represented in all parts of the globe, including Australia. A fossil species has been recorded from the Tertiary Strata.

Thomson divides the *Hylotomina* into two sub-tribes —the *Hylotomides*, with the posterior tibiæ spined and the radial cellule appendiculated, and the *Schizocerides*, with no spines on tibiæ and radial cellule not appendiculated, the latter too having the antennæ furcate in the males.

Genus—HYLOTOMA.

Hylotoma, Latr., Hist. Nat., iii, 302 (1802).
Arge, Schrank, Fauna Boica, ii, pt. 2, 226 (1802).

Radial nervure appendiculated; four cubital cellules, the second and third receiving each a recurrent nervure; lanceolate longly contracted. Basal nervure interstitial. Posterior wings appendiculated and with two middle cellules. Antennæ situated not far from the top of the eyes; simple in ♂, ciliated; often grooved in ♀. Four posterior tibiæ spined.

The mandibles are broad, with a curved outer edge and a blunt apex. The labial palpi have the two middle joints thicker and a little longer than the others. The basal three joints of maxillary palpi are of a denser texture than the three apical, and they are also thicker. The first is a little shorter than second, which is about half the length of third; the three apical become gradually longer. Blotch large; claws simple.

This is an easily recognised genus, its only European ally (*Schizocera*) being easily distinguished from it by the radial cellule not being appendiculated, and by the posterior tibiæ not being spined, while its ♂ is well marked by the cleft antennæ. The larvæ have from eighteen to twenty feet, and have the body generally beset with tubercles, each ending in a bristle.

The cocoon is double. The eggs are mostly deposited in the leaf twigs in a single or double row, each egg being in a separate hole. When the perfect insects are not metallic blue or green they are yellowish, at least in part.

The genus is very widely distributed over the globe, but more especially in the New World and in the Palæarctic region. There are twenty-six species in Europe.

Synopsis of Species.

1 (10) Abdomen luteous.
2 (3) Legs and thorax entirely bluish-black. *Pagana.*
3 (2) Legs more or less luteous.
4 (7) Pleuræ marked with yellow.
5 (6) Legs for the greater part bluish-black, hind tarsi not annulated with black. *Pagana*, var. *Stephensii.*
6 (5) Legs for the greater part yellow; posterior tarsi annulated with black. *Rosæ.*
7 (4) Pleuræ not marked with yellow.
8 (9) Femora black only at the apex. Anterior wings with a fascia below the stigma. *Cyanocrocea.*
9 (8) Femora quite black. Wings without a fascia below the stigma. *Melanochra.*
10 (1) Abdomen black or blue.
11 (17) Tibiæ more or less white, wings mostly hyaline.
12 (13) Wings hyaline, without a fascia; four anterior legs black, posterior tibiæ white. *Ciliaris.*
13 (16) Wings with only a fascia below the stigma.
14 (15) Third cubital cellule on lower side shorter than second. Sixth joint of maxillary palpi not double the length of fourth; wings yellowish; tibiæ and tarsi usually yellowish-white. *Ustulata.*
15 (14) Third cubital cellule on lower side as long as, if not longer, than second. Sixth joint of maxillary palpi double the length of fourth; wings hyaline; nervures black; posterior tibiæ pale in front, black behind. *Fuscipes.*
16 (12) Wings with a fascia and a violet-fuscous blotch in radial cellule; tibiæ and tarsi yellowish-white, abdomen with testaceous stripes on back. *Atrata.*
17 (11) Tibiæ entirely black, wings blackish-violaceous.
18 (19) Third transverse cubital nervure almost straight or but very slightly bent; the third cubital cellule not much longer than broad. Head distinctly widened behind. *Cœruleipennis.*
19 (20) Third transverse cubital nervure distinctly bent outwardly; the third cubital cellule not wider above than beneath. Head somewhat widened behind. Antennæ stout. *Enodis.*

20 (19) Third cubital nervure obliquely curved; the third cubital cellule much wider above than below. Head not dilated behind, slender. Antennæ long and slender. *Cyanella.*

1. Hylotoma cœruleipennis.

Pl. I, fig. 5, ♀; and Pl. IV, fig. 1, Larva.

Tenthredo violacea, Fabr., Iter. Norw., 64 (1779) ♀; De Geer, Mém., ii, 1025.
— *cœruleipennis*, Retz., De Geer, 72, 300.
— *enodis*, Lep., Mon., 45, 127.
Hylotoma enodis, Klug, Berl. Mag., vi, 285, 1; Htg., Blattw., 81, 1, pl. ii, f. 12—14 (lar.).
— *vulgaris*, Klug, Jahrb., i, 230; Br. and Zad., Schr. Ges. König., ii, 88, Taf. iii, f. 6 (lar.).
— *cœruleipennis*, Thoms., Hym. Sc., i, 36, 3; André, Species, i, 38; Cat., 4,* 1; Konow, B. E. Z., 1884, 307.
— *violacea*, Kirby, List of Hym., i, 55; Cam., E. M. M., xx, 83.

Bluish-black; antennæ, tibiæ, and tarsi black; head and pleuræ covered with a black pubescence, abdomen at apex with a silky, paler kind. Antennæ short, thickened at the apex. Head dilated behind the eyes; the fovea between the antennæ broad and obtuse. Clypeus slightly incised in the middle. Wings blackish-violaceous, the apex (especially the radial, third and fourth cubital, and the discoidal cellules) paler; hind wings also paler on lower side and at the apex. The third transverse cubital nervure is almost straight; the third cubital cellule is not much longer than broad; the transverse median nervure is received a little beyond the middle. In the posterior wings the transverse median nervure is received in apical fourth of the cellule, and the accessory nervure is appendiculated a little beyond the middle. Joints 1 and 2 of maxillary palpus subequal; the third considerably longer than the fourth and slightly longer than the fifth; the third dilated; the sixth is the longest, being not much shorter than the preceding two united, and distinctly twice the length of the fourth.

Length 4—5 lines.

The larva feeds on the narrow, smooth-leaved willows (*Salix alba*, *purpurea*, &c.). It is grass-green according to Zaddach (l. c.) with broad sulphur-yellow lateral folds, the head green, with black eye-spots, and the vertex is marked with black. Each segment bears transverse rows of brown raised points, each of which ends in a bristle-like hair. The body is convex above, flat on the under side; it becomes broader towards the middle, then narrows again towards the tail. There

are five pairs of short ventral legs. Spiracles black, white in the centre. It pupates in the earth. It is found feeding from July to September.

Apparently not common. I have only seen two specimens, probably from the South of England.

Continental distribution: Sweden, Germany, France, Italy.

2. Hylotoma enodis.

Pl. I, fig. 6, ♀.

Tenthredo enodis, Lin., S. N., i, 922, 11; Pz., F. G., Heft 49, pl. xiii.
— *ustulata*, De Geer, Mém., ii, 2, 1018, pl. xxxix, f. 14—20.
Arge ciliaris, Schrank, Fauna Boica, ii, 227, 1989.
Hylotoma atrata, Klug, Berl. Mag., vi, 301, 30; Htg., Blattw., 83, 2; Dbm., Prod., 6, 14.
— *enodis*, Br. and Zad., Schr. Ges. König., iv, 90, 3; Thoms., Hym. Sc., i, 36, 1; Ste., Ill., vii, 16, 4; André, Species, i, 39; Cat., 4,* 3; Konow, B. E. Z., 1884, 307; Cam., E. M. M., xxii, 84.

Violet-black; antennæ, tibiæ, and tarsi, bluish-black. The head is well developed behind the eyes; the front is broad, there is no carina, but the face over the clypeus is produced into a blunt ridge. The clypeus is scarcely emarginated. Wings violaceous, the apex lighter tinted; the third transverse cubital nervure is bent outwardly but not sharply nor obliquely; the third cubital cellule is a little shorter than the second and not much wider on upper than on lower side. Transverse median nervure received almost in the middle of cellule. In the hind wings the recurrent nervure is received a very little beyond the middle. The accessory nervure is appendiculated considerably beyond the middle.

Length 4½ lines.

The wings in this species are lighter coloured than in *cæruleipennis*, the dark violaceous tint, as a rule, only extending to the middle of the wings, while the posterior wings want it almost entirely. It is easily known from it otherwise by the curved third transverse cubital nervure, longer third cubital cellule, by the recurrent nervure in the hind wings being received nearer the middle of the cellule, and by the accessory nervure being appendiculated farther from the middle. The head is

less strongly dilated behind the eyes, and the front is more projecting and carinate.

H. pullata, Zad. (recorded from Prussia and Holland) is closely related to it; it differs in being much larger and broader, in having the head much more developed behind the eyes; the wings are much darker (deep violet-black, paler in the apical cubital and in the discoidal cellules), the third transverse cubital nervure is more oblique, so that the third cubital cellule is longer in upper than on lower side. *Pullata* feeds on birch.

3. HYLOTOMA GRACILICORNIS.

Vol. II, Pl. X, fig. 4, Larva; 4 *a*, Segment from the Back. Vol. III, Pl. I, fig. 7, ♀.

Hylotoma gracilicornis, Klug, Berl. Mag., vi, 287, 4; Htg., Blattw., 83; Br. and Zad., Schr. Ges. König., ii, 96, 7; André, Species, i, 40; Cat. 5,* 5; Cam., E. M. M., xx, 84.
— *pilicornis*, Leach, Z. M., iii, 121, 1; Ste., Ill., vii, 16, 1.
Ptilia pilicornis, Lep., Mon., 50, 145.
Hylotoma cyanella, Klug, Jahrb., i, 231, 24 (1834); Htg., Blattw., 83, 5; Thoms., Hym. Sc., i, 35, 2; Br. and Zad., Schr. Ges. König., iv, 94, 6, pl. iii, f: 10 (lar.); André, Species, i, 40; Cat. 5,* 7; Konow, B. E. Z., 1884, 308 and 309.

Metallic-blue, shining; antennæ, tibiæ, and tarsi, black. Head narrow, not developed behind the eyes; front projecting so that there is a distinct hollow between it and the eyes. Antennal tubercle deep, the sides carinated, and the tubercle is continued as a carina down the face. Clypeus slightly incised. Antennæ longer than thorax, rather slender, not much thickened towards the apex. Wings bluish-fuscous; somewhat (but not much) lighter towards the apex; third transverse cubital nervure obliquely curved, making the third cubital cellule distinctly longer on upper than on lower side, but in the ♀ it is not longer than the second cellule. The recurrent nervure in the hind wings is received a little beyond the middle of the cellule. The posterior tibiæ are grooved on the inner side; the anterior tibiæ are brownish-fuscous or dirty white in front; the blotch is large.

The ♂ has the antennæ long, slender, not dilated towards the apex; the third cubital cellule is longer, being distinctly longer than the second instead of shorter, as it is in the ♀.

Length 2½—3½ lines.

This species has a more slender body than any of the other species of the same coloration, and is easily known from them by the head not being dilated behind the eyes, by the more oblique third transverse cubital nervure, by the third cellule being more dilated on upper side, and by the longer and more slender antennæ.

The larva feeds on *Rubus idæus* during August and September. Its head is pale brownish-black, paler in front, and especially above the mouth, which is brown. Legs white, encircled with black at the base; first is a black ring, then a large broad one, and in front is a small black dot. Claws brown. Claspers white. Body dirty green, with a whitish tinge. On the back are two rows of black dots in the centre; on the sides are other two rows; below there is a row of large orange marks, eight in all, the first commencing over the third pair of legs; over each clasper is a large black dot, and over a number of them are some minute black dots, there being also some small dots close to the large yellow marks; the second segment is orange. From each of the black dots there issues a small hair. When very young, the orange marks are wanting; they only appear after the second moult. Zaddach describes the ground colour as reddish, but I have not noticed this colour, except occasionally along the back, and thought it was caused by the food. The larva pupates in the earth.

Near the larvæ I have noticed *Proterops nigripennis*, which is no doubt a parasite on them.

The perfect insect appears in June in Scotland, in May in England, and is not common. Cadder Wilderness, near Glasgow, Coombe Wood (Stephens).

Continental distribution: Sweden, Germany, France, Switzerland.

Obs.—Klug describes *gracilicornis* as having the antennæ reddish, but this is not a point of any value in specific discrimination.

4. Hylotoma ciliaris.

Pl. I, fig. 9, ♀; and Pl. IV, fig. 2, Palpus.

Tenthredo ciliaris, Lin., S. N., i, 922, 12 (1767).
Hylotoma cœrulea, Klug, Berl. Mag., vi, 289, 7; Htg., Blattw., 84; Ste., Ill., vii, 17, 6.
— *ciliaris*, Fall., Acta, 1808, 43, 6—7; Mon., 20, 3; Dbm., Prod., 6, 17; Evers., Bull. Mosc., xx, 9; Br. and Zad., Schr. Ges. König., ii, 98, 10; Thoms., Hym. Sc., i, 37, 4; André, Species, i, 41; Cat., 5,* 10; Cam., Fauna, 47, 3; Konow, B. E. Z., 1884, 308; Cam., E. M. M., xx, 83.

Shining bluish-black, but having a greenish hue; antennæ black; four anterior tibiæ and tarsi black or fuscous-black, posterior tibiæ white; the apex and tarsi blackish. Clypeus a little incised. Sixth joint of maxillary palpi short, not much longer than fourth. Wings hyaline, costa and stigma fuscous or fuscous-black, the nervures black. The third cubital cellule is shorter than the second, wider anteriorly than behind through the third transverse cubital nervure being somewhat obliquely curved. The second recurrent nervure is generally received very near the second transverse cubital and may be joined to it; the blotch is large, white. The sixth joint of maxillary palpus is one-fourth longer than the fifth, and they are shorter and thicker than in *fuscipes*.

Length 3½—4 lines.

Ab.—a. Wings fuscous throughout.

In this species the recurrent and the transverse nervures frequently become bifurcated at their junction with the recurrent nervures.

The larva is described by Rudow, S. E. Z., 1871, p. 383. He says it is green, darker on the back, and with two yellow lateral lines; the head is yellow, black on the vertex; legs yellowish, claspers green. It feeds on *Salix fragilis* in August and September.

Not common. New Galloway, South of England (Shuckard).

Continental distribution: Sweden, Russia, France, Switzerland, Germany.

5. Hylotoma fuscipes.

Pl. IV, fig. 4, Palpus.

Hylotoma fuscipes, Fall., Acta, 1808, 43; Thoms., Hym. Sc., i, 37, 5; André, Species, i, 41; Cat., 5,* 8; Konow, B. E. Z., 1884, 308; Cam., E. M. M., xxii, 88.
— *violacea*, Klug, Berl. Mag., vi, 289, 6; Htg., Blattw., 83, 7; Fall., Mon., 20, 2; Dbm., Prod., 6, 15; Ste., Ill., vii, 16, 5; Br. and Zad., Schr. Ges. König., ii, 96.
— *amethystina*, Klug, Berl. Mag., vi, 301, 30.
— *atrocærulea*, Lep., Mon., 44, 122; F. Fr., 13, pl. ii, f. 4.
Tenthredo nigripes, Retz., De Geer, 71, 298.
— *ustulata*, De Geer, Mém., ii, 2, 1018, pl. xxxix, f. 14—20.

Bluish or bronzy metallic black; antennæ black; tibiæ and tarsi fuscous or fuscous-black behind, dirty white in front. Clypeus incised; sixth joint of maxillary palpi double the length of fourth. Wings hyaline. Costa and stigma fuscous-black; below the stigma and extending to the cubital nervure is a fuscous cloud. Third cubital cellule a little longer than second, of equal length throughout. Third transverse cubital nervure curved. In the hind wings the recurrent nervure is received in the middle of the cellule. The fourth joint of the maxillary palpus is somewhat longer compared to the third and fifth than in *cæruleipennis*, but the last is longer and thinner compared to the preceding.

Length 5½—6 lines.

The coloration of the legs is variable, some specimens having much more white on the tibiæ, both before and behind, than others, while on the other hand other specimens have them quite black. Compared with *ciliaris*, *fuscipes* is a larger and broader insect; its head is, if anything, more swollen, the incision in the clypeus is deeper, and otherwise it is readily known from it by the fascia under the stigma, as well as by the longer third cubital cellule and sixth joint of maxillary palpi.

H. violacea has usually been regarded as identical with *fuscipes*, but Konow separates it as a distinct species, it differing from *fuscipes*, according to Konow, in the darker brownish wings, the clypeus not incised, the legs blackish, with only the fore knees in front and the hinder tibiæ before the apex, on the upper side, whitish; *fuscipes* having the wings almost hyaline, the clypeus distinctly incised, all the tibiæ reddish brown,

and the hinder pair before the apex on the upper side whitish. The distinction in the coloration is, in my opinion, of little value. All the whitish specimens I have seen are referable to *fuscipes*, Konow.

Thomson refers the Degeerian *ustulata* (*nigripes*, Retz.) to *enodis*, but this must be regarded as an error.

The larva, as described by De Geer, is clear green, with a dark green, bordered on either side by white, dorsal stripe. The skin is beset with warts, some of which bear short hairs. The head pale brown, somewhat yellowish, and with a dark brown longitudinal band. It fed in August on the common rose, entering the earth at the end of that month, spinning a cocoon of the usual kind. Curiously enough, no one has found this larva since De Geer's time.

Not common. Coombe and Darenth Woods (Stephens). André says the larva feeds on *Salix aurita*.

Continental distribution: Sweden, Russia, Germany, France, Tyrol, Italy.

6. Hylotoma ustulata.

Vol. II, Pl. V, fig. 7, ♀; 7 *a*, Antennæ; 7 *b*, *c*, Trophi; Pl. X, fig. 3, Larva; 3 *a*, Head. Vol. III, Pl. IV, fig. 5, Palpus.

Tenthredo ustulata, Linn., S. N., i, 556, 10 (1758); F. Su., 390; Pz., F. G., Heft 81, pl. x.
— *nitens*, De Geer, Mém., ii, 1016, 38, figs. 32—35.
— *ochroptera*, Fourc., E. P., ii, 365, 5.
— *flavipes*, Retz., De Geer, 71, 297.
— *pilicornis*, Pressyl., Mayer's Samml. Phys. Aufs., iii, 231.

Hylotoma leachii, Ste, Ill., vii, 17, 8.
— *ustulata*, Fab., S. P., 23, 9; Fall., Acta, 1807, 201, 6; Mon., 21, 4; Klug, Berl. Mag., vi, 290, 8; Ste., Ill, vii, 17, 7; Htg., Blattw., 84, 5; Lep., Mon., 43, 120; Dbm., Prod., 72, 17, pl. ii, figs. 46—52; Thoms., Hym. Sc., i, 38, 6; Cam., Fauna, 47, 2; André, Species, i, 42; Cat., 5,* 13; Br. and Zad., Schr. Ges. König., vi, 99, 12, Taf. iii, f. 5 (lar.); Konow, B. E. Z., 1884, 309; Cam., E. M. M., xxii, 85.
— *claripennis*, Rudow, S. E. Z., 1871, 382.

Bluish-greenish or bronzy-black; knees, tibiæ, and tarsi yellowish-white, apex of posterior tibiæ and tarsi testaceous or fuscous; antennæ black. Wings yellowish, especially at base; costa and stigma yellowish-testaceous; base of stigma and a cloud below it, which extends to the cubital nervure, fuscous or fuscous-black. Nervures testaceous at base, darker at apex; third cubital cellule a little shorter than the second, of nearly equal length on both sides; third transverse cubital nervure curved; the second recurrent nervure is received not far from the second transverse cubital nervure and is occasionally joined to it. Usually the third cubital cellule is clearly shorter than the second, but in some specimens it may be a little longer. The third joint of maxillary palpus is not much longer and thicker than the fourth. The sixth is only a little longer than the fifth.

Length 4—5½ lines.

Ab.—*a.* ♀ wings not yellowish, but clear hyaline.

b. ♂ wings not yellowish, nervures, costa, and stigma black or fuscous-black; tarsi and apex of tibiæ broadly black.

c. ♀ and ♂ apex of tibiæ and tarsi black.

d. ♂ fascia below stigma almost obsolete, legs black, tibiæ white at base. Body bronzy black; = *? expansa.*

e. Second transverse cubital nervure interstitial.

f. Hind wings with transverse cubital nervure obsolete (in *Ab.*—*b*).

No author describes *ustulata* as a variable insect, yet in Scotland it seems to vary considerably, especially in the coloration of the legs and wings. Thus Thomson separates it from *H. fuscipes* and *ciliaris* by the wings being yellowish and the tibiæ and tarsi pale yellow, while he characterises the two species I have named by the terms "alæ hyalinæ;" but neither the colour of the legs nor of the wings can be relied upon as marks of distinction between *ustulata* and *fuscipes*. With the darker specimens of *ustulata* the best marks of distinction are that *fuscipes* has the third cubital cellule a little longer than the second, while in *ustulata* it is shorter, and in *fuscipes* the sixth joint of the maxillary palpus is double the length of the fourth; in *ustulata* not more than one and a half times the length. In *ustulata*, too, all the tibiæ are white (often broadly) at the base.

From the antennæ varying in colour (it being sometimes testaceous) I suspect that *H. metallica* may also be referred to *ustulata*. Konow (l. c.) separates it from *ustulata* through the antennæ being reddish-yellow (in *ustulata* black), the body bronzy (in *ustulata* greenish blue-black); the wings yellow, with brown under the stigma (in *ustulata* yellow, with brown spot under the stigma).

I suspect that *H. corusca*, Zad. (which seems to differ only in having the hinder tibiæ white at the base and the rest of the legs black) and *H. expansa*, Klug (which agrees in coloration with *Ab.—d*, save only that it has the fasciæ below the stigma well developed) are only varieties of *ustulata*. The dark-legged specimens are all from the Highlands. I have never seen English specimens.

The larva has a rather small head, very light brown in colour, darker on the top, and there is a dark brown band going down the face from the back. Mouth deep brown, eyes black, and there is a light brown line going into them from the top. Body dark green, shining, back darker, and the dorsal vessel is bordered on either side by a white line; there is also a pale line going along the sides. The skin is beset with little black tubercles, each ending in a bristle-like hair; on the back these are arranged in pairs; on the sides there are two pairs, and a single one below the lower second pair, but this arrangement varies. Those on the thorax are somewhat larger than the others. The legs are whitish, spiracles brown. The body is flat on the ventral surface, over which the sides project so as almost to hide the legs; above, the body is convex, and it tapers towards the tail.

It feeds on willows and birches in the autumn, and spins a cocoon in the ground, or among dead leaves, &c.

Common and universally distributed in Britain.

Continental distribution: General.

8. Hylotoma atrata.

Pl. I, fig. 10, ♀ ; and Pl. IV, fig. 3, Palpus.

Tenthredo atrata, Forster, Cent., 80 (1771).
— *croceipennis*, Christ, Naturg., 450.
Arge ustulata, Schrank, F. B., ii, 226.
Cryptus segmentarius, Pz., F. G., Heft 88, pl. xvii.
Hylotoma segmentaria, Klug, Berl. Mag., vi, 291, 9; Htg., Blattw., 85, 12; Thoms., Hym. Sc., i, 36, 7; Ste., Ill., vii, 18, 10.
♂ — *Klugii*, Leach, Z. M., iii, 122, 4; Ste., Ill., vii, 17, 9, pl. xxxv, f. 4.
— *albicrux*, Brullé, Expl. Morée, iii, pt. 2, 395, 879.
— *discus*, Costa, Ric., Ent. Parten., 17 and 26, No. 19; F. N. Ilot., 4, pl. lxi, f. 5.
— *atrata*, Br. and Zad., Schr. Ges. König., vi, 102, 10; André, Species, i, 42; Cat., 5,* 14; Konow, B. E. Z., 1884, 309; Cam., E. M. M., xxii, 85.
— *saliceti*, Rudow, S. E. Z., 1871, 383.

Coppery-black, shining. Knees, tibiæ, and tarsi yellowish-white; wings yellowish-hyaline, costa and stigma yellowish-testaceous, a fuscous metallic fascia below the stigma, and the radial cellule is more or less infuscated, especially along the cubital nervure. Antennæ short, thick, not much more than double the length of the head. Head much swollen behind the eyes. Antennal tubercle broad, its borders not very distinct; above and below the ocelli is a deep rounded fovea. Clypeus a little incised; the front is wide, so that the antennæ are wide apart; the face is densely covered with a white silky pubescence. The third cubital cellule is shorter considerably than the second; the third transverse cubital nervure is scarcely curved. The transverse median nervure is received in front of the middle of the cellule. In the posterior wings the recurrent nervure is received in the apical sixth of the cellule; the blotch is very large, broad, extending nearly across the entire segment. In the abdomen, above, the middle segments are marked with transverse, dull, testaceous bands of variable extent. The apex of the abdomen is densely covered with silky white hairs. The fourth joint of maxillary palpus is short, not much longer than the second and about three-fourths of the length of the fifth. The sixth is longer than the fifth and more than twice the length of the fourth.

The ♂ has the wings fuscous throughout, but the radial cellule is darker, as in the ♀.

Length 3½—4½ lines.

The only record I can find of the larva of this species is a remark by Brischke (Schr. d. Natur. Ges. z. Danzig, vi, pl. i., fig. 10), who suspects that a larva which he found on oak was the larva of this species.

Konow (B. E. Z., xxviii, 309) divides the *atrata* of authors into three species: (1) *Thomsoni*, Sibi = *segmentaria*, Thoms.; (2) *atrata*, Forster; and (3) *segmentaria*, Pz. *Thomsoni* is said to have the discoidal cellule in the hind wing not much shorter than the sub-marginal, while in the two other species it is only about half the length, as it is in most of the species, *e. g. ustulata—i. e.* the recurrent nervure is received near the middle of the cellule, in *Thomsoni* near the apical fourth.

All the British specimens I have seen (as also all the German) are referable to *Thomsoni*. The characters given by Konow for separating these species from the colour of the legs, wings, and abdomen are not of much importance, for they vary to a considerable extent in *Thomsoni*. Moreover, the position of the recurrent nervure in the hind wings varies, it being received in some specimens nearer the middle than in others.

Subsequently (Deutsche Ent. Zeit., xxx, 73) he withdrew *Thomsoni* = *segmentaria*, Thoms., it being considered identical with *atrata;* but *segmentaria*, Pz., is apparently kept distinct, the distinction being that *segmentaria* has the wings slightly yellowish, almost hyaline, the radial cellule in the ♀ occupied by a violet iridescent brown cloud; the middle abdominal segments narrowly edged with yellow, and the tarsi yellowish-white, brownish at the apex; while in *atrata* the wings are brownish yellow with a fine violet iridescence, especially at the stigma and radial cellule; below the stigma and at the end of the radial cellule is a darker cloud, very weakly indicated in the ♂; the middle abdominal segments in the ♀ are broadly reddish-yellow, and the apical edges of the tibiæ are reddish-yellow. I am unable, however, to look upon these characters as valid for specific determination, for I find variations in all of them.

A species easily recognised by the fascia in the radial cellule, by the wide blotch, and by the transverse marks on the dorsum of abdomen. The recurrent

nervure in the hind wings, too, being received much nearer the apex of the cellule, is another mark of distinction.

The wings differ in the intensity of the brownish colour and of the blotches; also the legs vary in the amount of black they bear on the tarsi, and the abdomen may be entirely black (except the blotch).

The larva, Rudow says, is found on the alder and on *Salix fragilis*. He describes it as being uniformly green, and beset with small tubercles.

Rare. London district (Stephens).

Continental distribution: General. Common along the Mediterranean.

9. Hylotoma pagana.

Pl. I, fig. 1, ♀.

Tenthredo pagana, Pz., F. G., Heft 49, pl. xvi.
— *tricolor*, Gmel., Syst. Nat., i, pt. 5, 265, 7, 101.
— *nigriventris*, Pz., Schäff., Ins., 168, 237.
Hylotoma flaviventris, Fall., Acta, 1807, 202, 8.
— *pagana*, Latr., Nat. Hist., xiii, 134, 5; Spin., Ins. Lig., i, 53, 12; Klug, Berl. Mag., vi, 61, 11; Fall., Mon., 23, 8; Lep., Mon., 45, 123; Dbm., Consp., 6, 19; Dbm., Prod., 77, 20, pl. ii, f. 56; Htg., Blattw., 87, 14; Ste., Ill., vii, 19, 15; Tasch., Hym., 13; Thoms., Hym. Sc., i, 41, 10; Tasch., Ent. Gärt., 148(lar.); Br. and Zad., Schr. Ges. König., iv, 104, 30; André, Species, i, 44; Cat., 5,* 16.
— *Stephensii*, Leach, Z. M., iii, 123, 6; Curt., B. E., ii, pl. lxv; Ste., Ill., vii, 19, 14; Cam., Tr. Ent. Soc., 1879, 107.
— *similis*, Smith (*nec* Voll.), Trans. Ent. Soc., 1874, 375.
— *dubia*, Kirby, List of Hym., i, 64, pl. v, f. 10 (♀).

Violet-black, shining; tibiæ and tarsi paler. Abdomen luteous; blotch large, white; antennæ longish. Wings violet-black. Second recurrent nervure received a little in front of middle of cellule.
Length 2½—4 lines.

Ab.—a. ♂ antennæ pale.
b. ♂ and ♀ tibiæ and tarsi pale testaceous.
c. ♀. Pleuræ yellow (*Stephensii*).

The var. *Stephensii*, besides having the pleuræ yellow, has the four hinder femora pale yellow ; the pleuræ in the ♂ are also sometimes yellow, and the sutures of the mesonotum, and the posterior tibiæ and tarsi are occasionally for the greater part of the same colour, while on the other hand there may be only a slight trace of this colour in the pleuræ in the darker-coloured specimens. The labrum and the two front legs may be tinged with yellow, and the antennæ may be fuscous or light brown. Eversman (Bull. Mosc., xx, 11) describes a ♂ of *pagana* having the tibiæ and tarsi luteous, but this may possibly be referable rather to *H. fuscipennis*, H.S.

The larva is yellowish-green with eight rows of black shining tubercles, those in the three lateral rows being the largest. It feeds on roses.

According to Réaumur (Mém., ii, 122, pl. xv, figs. 1—3) the eggs are laid in a double row in pairs placed close against one another in the branches of the rose. Goureau confirms this and records *Scolobates auriculatus*, Fab., as a parasite. Brischke states that the larva resembles that of *H. rosæ*, but differs from it in having three transverse rows of black shining tubercles, but on the last segment there is only one row.

So far as my experience goes *pagana* is not common in England, where it is confined to the middle and south.

It is universally distributed over Europe, also in Japan and in the East Indies.

It has also been recorded from North America (Georgia), but *H. abdominalis*, Leach, may have been mistaken for it.

10. Hylotoma rosæ.

Pl. I, fig. 4, ♀, and Pl. IV, fig. 8, Lar. after Brischke.

Tenthredo rosæ, Lin., S. N., i, 557, 21; F. Su., 393; Pz., F. G., Heft 49, pl. xv; Fab., E. S., ii, 109, 18; De Geer, Mém., ii, 279, tab. 39, f. 21—29.
— *ochropus*, Gmel., Syst. Nat., i, 2657, 102.
Hylotoma rosarum, Klug, Berl. Mag., vi, 292, 10; Fall., Mon., 22, 7; Dbm., Consp., 18, 9; 6, 18; Htg., Blattw., 85, 13; Tasch., Hym., 13; Thoms., Hym. Sc., i, 40, 9; Bouché, Naturg., 135.
— *rosæ*, Fab., S. P., 25, 16; Fall., Acta, 1807, 203, 10; Spin., Ins. Lig., i, 52, 6; Lep., Mon., 46, 130; Klug, Jahrb., i, 231, 16; Dbm., Prod., 75, 19, pl. 2, f. 53—55 (lar.); Ste., Ill., vii, 18, 13; André, Species, i, 47; Cat., 6,* 26; Br. and Zad., Schr. Ges. König., iv, 109, 39, pl. iii, f. 8 (lar.); Tasch., Ent. Gärt., 145, f. 35. For larva: Réau., Mém., v, pl. xiv, f. 1—12; Roesel, Ins. Belust., 2, Bomb. 15—17, tab. ii, f. 1—6.

Luteous. Head, mesonotum with scutellum, metanotum, breast, apex of tibiæ, tarsal joints at the apex, trochanters and anterior coxæ, black. Wings yellowish, almost hyaline at apex. Stigma and costa, except at base, where it is yellow, black; sheath black at extreme apex. Face covered with a griseous pubescence, a black pubescence on the vertex. Palpi pale yellow, mandibles griseous at base. The second recurrent nervure is almost interstitial.
Length $2\frac{3}{4}$—$4\frac{1}{4}$ lines.

The black marks on the four anterior tibiæ and tarsi are not so distinct as on the posterior pair.

Ab.—*a.* ♂ antennæ reddish from second joint.
b. ♂ Antennæ reddish beneath.
c. ♀ posterior trochanters immaculate.
d. ♀ posterior coxæ black.
e. ♀ abdomen black at base in middle.

Fallén (Mon., l. c.) mentions that he had a ♂ example which had four antennæ, of which the three shorter issued from one common root. All were ciliated.

The larvæ feed on wild and cultivated roses, and to the latter do occasionally some damage. The head is

black but becomes brownish-yellow after the last moult and bears then two small marks on the vertex, and there may be also a transverse mark; the eyes are black, mouth brown. The body is bluish-green, the dorsal vessel is flanked by yellow marks of variable size which may become united and thus make the back entirely yellow. All the segments, except the second and last, bear six rows of shining, black, bristle-bearing tubercles of various sizes, which form so many rows along the body. Below these, over the legs, is a larger shining black spot which bears several bristles, and succeeding this is a smaller black mark. The last two segments bear only small tubercles, and over the anus is a large black mark. The spiracles are small and black. The thoracic legs have black claws and a black plate above. The former has in front a brownish wart.

The larvæ are found from July to October. The eggs are laid in the rose twigs in a double row, each egg being laid in a separate incision, which becomes blackened. Two broods are met with during the year. The pupa state is passed in a double cocoon of the usual form in the earth. *Eulophus hylotomarum*, Bouché, *E. migrator*, Bé., and *E. incubator*, Bé., are parasites.

Von Stein (Ent. Nachr., 1878, 288) finds that *rosæ* is parthenogenetic and gives (l. c.) many details about its oviposition, &c.

Common in the South of England.

Continental distribution: all over Europe.

11. Hylotoma Cyaneo-crocea.

Pl. I, fig. 2, ♀.

Tenthredo cyaneocrocea, Forster, Nov., Sp. Ins., 78.
— *cœrulescens*, Fab., S. E., 321, 18; Pz., F. G., Heft 49, pl. 14; Rossi, Fn. E., ii, 38, 714.
— *bicolor*, Schrank, Beitr. z. Nat., 84.

Hylotoma cœrulescens, Klug, Berl. Mag., vi, 294; Fab., S. P., 24, 12: Fall., Acta, 1807, 202, 9; Mon., 24, 10; Spin., Ins. Lig., i, 51, 2; Lep., Mon., 42, 116; Dbm., Consp., 6, 29; Prod., 78, 21; Htg., Blattw., 87, 15; Tasch., Hym., 13; Thoms., Hym. Sc., i, 41, 11.

— *cyanocrocea*, Ste., Ill., vii, 18, 11; Br. and Zad., Schr. Ges. König., ii, 106, 33; André, Species, i, 46; Cat., 6,* 20.

Bluish-black, shining. Abdomen and legs yellow; coxæ, trochanters, and four anterior femora, posterior femora at apex, anterior tibiæ at apex, apical joints of tarsi and sheath of saw, bluish-black. Wings yellowish, smoky at apex, and with a distinct narrow fuscous fascia below stigma; stigma black.

Length 3—4 lines.

In the ♀ the anterior tibiæ are darkened at base; in ♂ they are quite yellow; in the ♂ also the tarsi have not so much black colour, but the black colour on the legs varies in both sexes.

Easily known by the colour of the legs and wings. The larva is unknown.

"Abundant on umbelliferous plants throughout the metropolitan district in June and at beginning of July," Stephens, l. c. New Forest.

Continental distribution: Sweden (?),* Germany, France, Russia, Austria, Switzerland, Italy, Morea.

12. Hylotoma melanochra.

Pl. I, fig. 3, ♀.

Tenthredo melanochra, Gmel., Syst. Nat., v, 2637, 100.

Hylotoma femoralis, Klug, Berl. Mag., vi, 295, 14; Htg., Blattw., 87, 16; Ste., Ill., vii, 18, 11; Dbm., Prod., 6, 21.

— *dimidiata*, Lep., Mon., 43, 118; F. Fr., 12, 3, pl. ii, f. 2.

— *similis*, Rudow, S. E. Z., xxxii, 384.

— *melanochra*, Br. and Zad., Schr. Ges. König, ii, 107, 34.

Head, thorax, femora, coxæ, trochanters, apex of posterior tibiæ, apical joints of tarsi, apex of abdomen, and sheath, bluish-black; abdomen luteous. Antennæ black. Wings hyaline; costa yellow; stigma

* Dahlbom records it from Sweden, but not Thomson.

for the greater part bluish-black, with a black fascia at extreme base of radial cellule.
Length 3 lines.

Easily known from *cyanocrocea* by the totally bluish-black femora, black antennæ, and yellowish wings, with only a very small fascia in the radial cellule. *H. mediata*, Fall., differs from it in having the base of abdomen bluish-black, the belly marked with black; there is a large fascia below the stigma, while there is no black on the posterior femora.

Rudow (l. c.) describes the larva as being green, darker on the back, with two yellowish dorsal stripes and yellow apex of abdomen. The thoracic legs are yellow, claspers green. It feeds on *Salix fragilis*.

Common in the South of England, London district, New Forest, &c.

Continental distribution: Finland, Sweden, France, Russia, Germany, Austria, Bohemia, Hungary, Tyrol.

Genus—SCHIZOCERA.

Schizocère, Latr., Fam. Nat., 442.
Schizocerus, Ste., Ill., vii, 19.
Schizocera, Htg., Blattw., 87.
Cryptus, Leach, Z. M., iii, 121, 125, *nec* Auct.
Cyphona, Dbm., Consp., 6.

Radial cellule not appendiculated; four cubital cellules; lanceolate cellule longly contracted. Posterior tibiæ not spined; ♂ with the third joint of antennæ cleft in two, ciliated.

Thomson splits up *Schizocera* into two genera—*Schizocera* having, according to him, the lanceolate cellule petiolate and the antennæ inserted over the clypeus, and *Cyphona* with the antennæ well up on the front and the lanceolate cellule constricted. In some species of *Schizocera* the lanceolate cellule is certainly constricted, and, I believe, this is the case with all of them, only the basal portion of the accessory nervure is very short and not always easy to see. The form of this cellule, therefore, cannot serve to separate generically the two divisions, while I find so many grada-

tions in the mode of insertion of the antennæ that I am unable to look upon this as a generic character. Further, the same species formed the type of *Schizocera* and *Cyphona*, so that the latter name is scarcely admissible. If then *S. geminata* is to be separated from *Schizocera* the name of *Sericocera*, Brullé, should be used, as that does not seem to differ from *Cyphona* as defined by Thomson, except in having the antennæ longer, and with a longer and more silky pubescence.

Our two British species belong to *Cyphona*. The epistoma is indistinctly keeled. There is no cross nervure in the costal cellule; the basal nervure is received considerably in front of the first cubital cellule; the first transverse cubital nervure is often very faint; the third cellule short, not much, if any, broader than long, dilated at the apex; the second recurrent nervure is received quite close to, or joined to the second transverse cubital. The abdominal segments are, at the base, depressed a little, so that the apex of the segment in front is higher.

Synopsis of Species.

1 (2) Body entirely black, legs black, tibiæ and tarsi white. *Geminata.*
2 (1) Abdomen and thorax in part luteous; femora in part or wholly and tibiæ and tarsi, yellow. *Furcata.*

1. Schizocera geminata.

Pl. II, fig. 1, ♂.

Tenthredo geminata, Lin., S. N., (1) v, 2668, 137 (1789).
Hylotoma geminata, Klug, Berl. Mag., vi, 305, 36; Htg., Blattw., 88.
Cryptus pallipes, Leach, Z. M., iii, 125, 3; Lep. Mon., 53, 152; Curt., B. E., ii, pl. lviii.
Hylotoma costata, Fall., Acta, 1808, 45.
Schizocera pallipes, Ste., Ill., vii, 20. 2.
— *geminata*, Br. and Zad., Schr. Ges. König, iv, 115, 1; André, Species, i, 49; Cat., 6,* 1.
Cyphona geminata, Thoms., Hym. Sc., i, 17, 1.

Coppery-black; covered with a dense cinereous pubescence which is especially long on the head. Knees, tibiæ, and tarsi obscure testaceous;

the apices of the tarsal joints darker, clypeus brownish, palpi pale. Wings obscure hyaline, darker at apical third. Costa and stigma fuscous; third cubital cellule much shorter than second, wider at apex than at base; third cubital nervure oblique but not curved. Head not dilated behind the eyes. Scutellum raised, punctured; the suture at its base deep, wide.

Length 3 lines.

Rare. London district, Strathcarron, Ross-shire. The larva is reported to feed on *Rumex acutus*.

Continental distribution: Sweden, Germany, Austria, France, Tyrol, Silesia.

2. SCHIZOCERA FURCATA.

Vol. II, Pl. V, fig. 9; ♂ 9 *a*, Antenna ♀; 9 *b*, Antenna ♂.

Tenthredo furcata, Vill., Ent., iii, 86, 19, pl. vii, f. 16, ♂, 17, ♀ (1789); Fab., E. S., supp. 215; Pz., F. G., Heft 46, pl. i.
— *rubi-idæi*, Rossi, Faun. Etr., ii, 31, 731.
Hylotoma furcata, Klug, Berl. Mag., vi, 301, 31; Fab., S. P., 22, 8; Fall., Acta Holm., 1808, 44; Mon., 25, 11.
Cryptus furcatus, Lep., Mon., 52, 149.
Schizocera furcata, Br. and Zad., Schr. Ges. König., vi, 118; André, Species, i, 51; Cat., 7,* 9.

Var. *angelicæ*.

Tenthredo angelicæ, Pz., F. G., Heft 72, pl. i.
— *melanocephala*, Pz., l. c., Heft 64, pl. v.
— *taraxaci*, Pz., Ent. Versl., ii, p. 24.
Hylotoma angelicæ, Klug, Berl. Mag., vi, 302, 32.
Cryptus angelicæ, Lep., Mon., 53, 152; F. Fr., pl. 2, f. 6.
Cyphona angelicæ, Thoms., Hym. Sc., i, 48, 2.

Black; abdomen and legs yellow; coxæ at base, trochanters and base of femora (especially the four anterior) more or less black. Clypeus and palpi yellowish. Wings obscure hyaline, darker at the basal three-fourths; third cellule much shorter than second, wider than long, dilated at apex; third transverse cubital nervure curved; second recurrent nervure received not far from second transverse cubital and in the third cellule; ♂ sometimes interstitial.

Length 3½—4 lines.

In a British ♂ the third cubital cellule is much wider at the apex on upper side than on lower, through the third transverse cubital nervure taking a curve from the bottom towards the apex of the wing. In the other specimens I have there is no great difference

between the upper and lower side. In all the examples I have there is no distinction between the two sexes in coloration. On the Continent specimens occur with the base of the abdomen black and the femora more or less of the same colour and the tarsi black or fuscous, wholly or in part. The var. *angelicæ* has the thorax luteous, except on the breast, the abdomen and legs being also of this colour. I believe it has not occurred in this country. The tegulæ vary from black to reddish, and the tibiæ may be infuscated.

Brischke (Beob., p. 123) states that the *geminata* of Zaddach (l. c.) is not the Linnean species, it differing from the latter in wanting the dark wing band, in the tegulæ being reddish-yellow, the scutellum keeled, and the tibiæ uniformly reddish-yellow.

The larva has been described by Brischke (Schr. Ges. Natur., Danzig, 123, pl. viii, fig. 8). It feeds on *Rosa canina*, eating the leaves along the edges. The body is 15 mm. long, shining; twenty-footed; the ventral legs small, peg-shaped; the anal legs are developed, but seldom used. Above the body is rounded, beneath flat; transversely wrinkled. Each segment laterally is three times angularly sinuated, and on each stigma-bearing segment is, on a swelling, a clearly stalked gland. Anal lobe broad, above indistinctly incised, behind rounded, ciliated, and pointed on either side. The ground colour is green, but darkened down the back by the food canal. Eye-spots black; mandibles brown; stigmas black, edged with white.

The cocoon is meshy in texture, and yellow, and is spun in the earth. The eggs are laid in the twigs.

Continental distribution: Sweden, Germany, France, Italy, Russia.

Sub-family LOPHYRINA.

Antennæ from 17—23-jointed, serrate beneath, and more rarely on the upper side as well in ♀, flabellate doubly or singly in ♂. Wings with one radial and four cubital cellules, but the first transverse cubital nervure may be obsolete. The second and third cellules receive each a recurrent nervure. Lanceolate cellule with a straight cross nervure, constricted in the middle (*Monoctenus*) or petiolate (*Cladomacra*). Costal cellule wide, with an oblique cross nervure. Transverse basal nervure usually straight, and received close to cubital, or curved and received at a little distance from it. Posterior wings with two or, more rarely, one middle cellule. Head narrow, rounded, and retreating behind the eyes, which are placed nearly in the centre. The head is somewhat convex in front, almost straight behind. Labium 3-lobed, labial palpi 4-jointed; maxillary 6-jointed. The outer lobe of the maxilla is longer than inner, and is narrow and sharply pointed at the apex. Mandibles usually with two subapical teeth. Pronotum large, a little hollow in front of the tegulæ, rounded and projecting at the sides. The head is closely pressed to it, and is placed considerably lower down than the mesonotum, which rises from the base. Fore lobe of metanotum not developed; cenchri touching scutellum. Abdomen broad, thick, broadly rounded at the apex. Hypopygium large, oval.

The ovipositor is very strongly built. The saw proper has strong toothed crossbars. The most singular structure connected with the ovipositor is the basal portion of the sheath, which is very large and narrowed to a point at the apex; the apical piece being attached to the apex following the curve of the basal scale.

The larvæ are cylindrical, elongated, almost glabrous, have twenty-two feet, and generally are pale or bright green in coloration; if the former the bodies bear black marks as a rule. They are attached exclusively to *Coniferæ*, to which, from their great numbers and voracity, they have been known to do enormous damage. Most of them are social, feeding in companies on the pine needles; and usually they do not leave a branch until every leaf has been devoured. The eggs are laid in the pine needles to the number of ten or twenty, each female probably laying close on 100 eggs. The double cocoon is mostly spun at the foot of the pines; more rarely on the branches. Some of the larvæ give out a resinous exudation from their

bodies and a liquid, also of a resinous smell, from the mouth. In Britain these insects have not been so injurious to the pines as they have been on the Continent, but still occasionally they appear in enormous numbers in plantations of Scotch firs. When they have been abundant, the cocoons are found massed more or less together among the loose moss, leaves, &c., at the foot of the trees; and by collecting and destroying these much may be done to prevent an attack of the larvæ in the following year. It has also been suggested that the larvæ be crushed by a man armed with a strong pair of gloves; by sprinkling them with naphtha by means of a brush roughly made of feathers, when they at once fall to the ground; by syringing them with a solution of hellebore; and by shaking them early in the morning from the trees into a sheet, when they can readily be destroyed. Cf. Ormerod, Man. of Inj. Ins., p. 230.

Fortunately, they have an exceptional number of insect enemies in the shape of Ichneumons and parasitic Diptera; various birds feed on the perfect insects; but few of them will touch the feeding larvæ, probably from the resinous exudation having a prejudicial effect on them. Mice have been known to devour the larvæ in the cocoons, and squirrels will likewise eat the spun-up larvæ.

In the form of the head and thorax this group approaches closely the *Cimbicina*, and in the latter peculiarity it also resembles the *Hylotomina;* but in the peculiar structure of the antennæ and of the ovipositor it widely departs from both. In these respects it has no near Palæarctic or Nearctic relatives. Its nearest allies are to be found in the Neotropical and Australian regions of the globe,—in the former by *Lophyroides*, *Perreyia*, and their allies, in the latter by *Pterygophorus*. *Perreyia*, &c., form a distinct sub-family separable from *Lophyrus* by the entire labium, by the paucity of joints in the palpi, by the antennæ never having more than seventeen joints, nor have the posterior wings

more than one median cellule, and may even have none. The tarsi too bear no patellæ, and both wings may have appendicular cellules, while as often as not, the accessory nervure in the hind wings may be absent. *Pterygophorus* also belongs to a distinct sub-family, which differs both from the *Lophyrina* and *Perreyina* in the lanceolate cellule being obsolete. The accessory nervure in the hind wings is also absent; the latter have only one middle cellule, and the anterior are appendiculated.

Whether *Cladomacra* and *Polyclonus* (both from the Australian region) should form a separate sub-family, or only a sub-tribe, of the *Lophyrina*, is a point which I cannot determine in the meantime; but both differ from the *Lophyrina* proper in the posterior wings being appendiculated, and in their having no middle cellules, the transverse and recurrent nervures being absent, such being also the case with the accessory. The antennæ are long, straight, the rami being also perfectly straight and single, not curled as in *Lophyrus* and *Monoctenus*, while the legs have no patellæ; the two genera I have named cannot be placed in the *Pterygophorina*, which differ from them in the front wings being appendiculated, in having no lanceolate cellule, the patellæ distinct, the antennæ in ♂ short and curved, &c.

Lophyrus is confined mainly to the Palæarctic and Nearctic regions, there being twenty-one European species, and fifteen North American; a species is also known from Cuba and another from India. There are only two genera:

Lophyrus, with an open lanceolate cellule with an oblique cross nervure, the calcaria membranous at the apex, and the antennæ with a double row of pectinations in the ♂; and

Monoctenus, Dbm., with the lanceolate cellule constricted in the middle, the calcaria not membranous, and the antennæ in the ♂, with but a single row of pectinations. It differs from *Lophyrus* also in having the fore lobes of the metanotum well developed.

Genus—LOPHYRUS.

Lophyrus, Latr., Hist. Nat. Crust. Ins., iii, 302.
Diprion (part), Schrank, Fauna Boica, ii, pt. 2, p. 252.

Synopsis of Species.

Females.

1 (2) Antennæ 23-jointed. Head, thorax, abdomen and legs, red; metathorax and base of abdomen black. *Sertiferus.*
2 (1) Antennæ 19—20-jointed. Head and thorax more or less black.
3 (4) Seventh segment deeply incised in front of saw. Antennæ 19—20-jointed, femora more or less black, head black. *Pini.*
4 (3) Seventh ventral segment not incised in the middle, antennæ 18—19-jointed, femora not marked with black.
5 (6) Antennæ 19-jointed, head entirely black, thorax (and head) strongly punctured. *Variegatus.*
6 (5) Antennæ 18-jointed.
7 (8) Calcaria simple, meso-metanotum and back of abdomen, black, head entirely black. *Pallipes.*
8 (7) Calcaria dilated, head and thorax testaceous, marked with black.
9 (10) A fascia across the vertex, mesosternum broadly black, abdomen testaceous, with black transverse bands on the back. *Virens.*
10 (9) No fascia across vertex, mesosternum without black, dorsum of abdomen entirely black. *Dorsatus.*

Males.

1 (2) Antennæ 23-jointed, legs and ventral surface in middle red, thorax and abdomen smooth, shining, impunctate. *Sertiferus.*
2 (1) Antennæ not 23-jointed, thorax punctured.
3 (4) Femora, coxæ and trochanters, black. Stigma piceous, black at base. *Pini.*
4 (3) Coxæ and trochanters partly, and femora entirely, testaceous.
5 (6) Accessory nervure appendiculated close to the apex, antennæ 18-jointed, abdomen testaceous. *Pallipes.*
6 (5) Accessory nervure appendiculated a little beyond the middle, abdomen reddish.
7 (8) Pronotum and mouth entirely black. *Variegatus.*
8 (9) Pronotum not entirely black.
9 (10) Pronotum almost entirely yellow, antennæ 21-jointed. *Virens.*
10 (9) Pronotum with only a narrow testaceous line, antennæ 17—20-jointed. *Dorsatus.*

SECTION 1.—*Accessory nervure in hind wings received a little beyond the middle. Head and thorax strongly punctured.*

A. Inner spur on the posterior tibiæ dilated into a leaf-like expansion. A more or less clearly-defined fascia across the vertex. Antennæ 23-jointed (species 1 and 2).

1 (2) A broad black fascia on the front; breast broadly black; scutellum slightly punctured. *Virens.*
2 (1) No fascia on vertex or black on breast; scutellum strongly punctured. *Dorsatus.*

1. LOPHYRUS VIRENS.

Pl. II, fig. 4.

Lophyrus virens, Klug, Berl. Mag., vi, 58, 7; Fall., Mon., 16, 7; Dbm., Prod., 91, 28; Htg., Blattw., 119, 2, pl. xi, f. 6 (lar.); Thoms., Hym. Sc., i, 54, 2; Voll., Tijd. Ent., xvi, 1, pl. i; André, Species, i, 61 and 65; Cat., 8,* 2; Cam., Fauna, i, 47, 1.

Testaceous, shortly pilose, mesonotum covered with scattered, moderately large punctures. The greater part of the scape, a transverse mark over the antennæ, a quadrate spot on middle lobe of mesonotum, a longer narrower one on each of the lateral lobes, two or three small marks in front of the scutellum, the extreme apex of scutellum, most of the metanotum, a mark on mesopleura, the greater part of the breast, and a broad transverse line on each of the abdominal segments, black. The extreme base of posterior coxæ is also black, and the apex of hind tibiæ; the tarsal joints at the apex are fuscous. Wings hyaline, nervures pallid testaceous.

♂ black, densely covered with a pale pubescence; pronotum, a roundish mark on mesopleura, and legs, testaceous; the sides and ventral surface of abdomen red.

Length 3½—4 lines.

Most of the Continental specimens of *virens* I have are darker (having much more black on the thorax) than the Scotch examples I have described. In most Continental specimens the pleuræ are black, save a triangular testaceous mark; and the lobes of the mesonotum are black, only testaceous at the edges. The black stripes on the dorsum of abdomen tend to become confluent as in *dorsatus*.

The larva is green, including the head. On the latter a blackish or dark stripe runs from the vertex into each eye, and the face may be more or less black; the mandibles are brownish, the skin is smooth and shining, the sides are paler below the spiracles, and along the middle runs a darker green stripe, there being also a darker green stripe down the back. Under the spiracles the skin folds are white. Legs green with blackish claws; the ventral legs are paler.

According to Hartig the larvæ of *virens* are found mostly during the last half of June in Germany, and chiefly upon pines of from twenty to thirty years old. The cocoon is spun in July, the flies appearing in May and June of the following year. In Scotland I have found the flies during the latter end of June.

Parasites on the larvæ are:—*Tachina bimaculata*, Htg.; *Tryphon leucostictus*, Rtz.; *T. scutellatus*, Htg.; *T. succinctus*, Gr.; *T. transiens*, Gr. *T. scutellatus* is a parasite on the *Tachina*.

Rare: Rannoch.

Continental distribution: Sweden, Germany, France.

2. Lophyrus dorsatus.

Vol. II, Pl. XII, fig. 9, Larva.

Tenthredo dorsata, Pz., F. G., Heft 62, pl. ix (1799).
— *pectinata*, Retz., De Geer, 74, 318.
— *pinastri*, Bechst. und Scharf., Nat. schädl. Forstins., iii, 864.
Lophyrus pallidus, Klug, Berl. Mag., vi, 54, 4; Fall., Mon., 15, 4; Dbm., Prod., 89, 27; Ste., Ill., vii, 21, 3; Htg., Blattw., 126, 5; Thoms., Hym. Sc., i, 55, 3; Cam., Fauna, i, 47, 2; André, Species, i, 61 and 64; Cat., 8,* 5.
Hylotoma dorsata, Fall., Acta, 1807, 197, 2.
Lophyrus minor, Lep., Mon., 54, 155; Vill., Ent., iii, 87.
For larva cf. De Geer, Mém., ii, 254, pl. xxxv, f. 24—27.

Testaceous, three narrow bands on the mesonotum. Metanotum and dorsum of abdomen black. Legs testaceous. Wings hyaline. Scutellum sparsely punctured.

♂ black, the edges of the pronotum and legs, labrum, clypeus, and a

small mark on either side of vertex, testaceous; belly reddish-testaceous; scutellum strongly punctured.
Length 3 lines.

The ♀ may be known from the same sex in *virens* by there being no fascia over the antennæ, there being only a small dark space surrounding the ocelli, by the underside of the thorax bearing no black, and by the scutellum being much less strongly punctured.

The ♂ may be readily known from that of *virens* by the spots on vertex, by the narrow testaceous line on the pronotum, by the back of abdomen being entirely black, the underside too being not red as in *virens*; the antennæ are more slender, the last two joints are distinctly shorter than preceding, while in *virens* the last three are of nearly equal length and considerably thicker. *Pallipes* ♂ is not so densely pilose as *virens* ♂ and is much narrower, especially the thorax. André gives the antennæ as seventeen to twenty-jointed. The specimens I have appear to have twenty-three joints.

The larva has the head reddish-brown. The face is more or less marked with black, the mouth darker, mandibles brownish. Body dark green, sometimes with a yellowish tinge, paler at the sides, and with a dark dorsal and lateral stripe. Spiracles surrounded with black. Over each ventral leg is a double dark green spot, but they are not always clearly defined. Legs banded with black. The coloration of the head varies.

The larvæ are found during July, August and September, the flies early in June.

The following parasites have been recorded:—*Limneria argentata*, *L. larvincola*, Schbrg.; *Mesochorus rubeculus*, Htg.; *Tryphon adspersus*, Gr.; *T. lophyrorum*, Htg; *T. impressus*, Gr.; *T. tenthredinum*, Schbrg.; *T. variabilis*, Rtz.; *Masicera gilva*, Htg.; *Tachina bimaculata*, Htg.; *T. inclusa*, Htg.

Not common: Oban (Leach), Bishopton.

Continental distribution: Sweden, Germany, France, Switzerland.

B. Posterior spurs not dilated, simple.

Seventh abdominal segment not incised, oblong. Legs for the greater part whitish-yellow; abdomen yellow, broadly banded with black (species 3, *variegatus*).

3. Lophyrus variegatus.

Pl. II, fig. 5, ♀.

Lophyrus variegatus, Htg., Blattw., 137, 8; Konow, B. E. Z., 311.

— *frutetorum*, Thomson, Hym. Sc., i, 57, 5; Cam., Fauna, i, 48, 3 (*non* Htg.).

Black; the pronotum, pleuræ, and sternum, the greater part of the ventral surface, the edges of the abdominal segments above, pale testaceous, the legs pallid; the femora (especially the posterior) brownish suffused with black; the apex of tarsal joints and of the tibiæ blackish; basal two joints of the antennæ pale; the hinder edge of the vertex obscure brownish. Wings clear hyaline; the stigma and costa testaceous, the former black at the base. Head strongly punctured; the vertex in the centre broadly but not sharply raised, projecting behind, the lateral furrows being wide, shallow, and indistinct; there is a narrow indistinct furrow immediately behind the ocelli; frontal fovea oval, deep; clypeus sharply incised. Thorax strongly and coarsely punctured. Middle furrow of mesonotum complete, narrow; post-scutellum very coarsely, rugosely punctured, as long as the basal abdominal segment, which is shagreened.

The ♂ is black, the belly reddish, paler towards the base; strongly punctured; genital lobes pale red, oblong, triangular at the apex, punctured; the apex of the antennæ curved.

Length fully 3½ lines.

The above is a description of the British specimens I have, but, according to Continental authors, the species is very variable, the thorax being marked with testaceous or pale markings; the scutellum is as often as not broadly spotted, and the abdomen may have the segments broadly belted all round above. The antennæ are from eighteen- to twenty-jointed, but nineteen appears to be the commonest number.

The larva has the body of the green colour of the pine leaf, with a dark double dorsal stripe and a broader (also dark) lateral stripe. The skin fold is

green, not white, and the base of the legs is spotted with dark green. The thoracic legs have shining black plates, the head is roundish, claws reddish-brown, marked with variable spots on the face and vertex.

In Germany there are two broods in the year, the first between the middle of June and the middle of July, the second in the autumn.

The parasites recorded from the larvæ are: *Hemiteles eryngii*, Ratz.; *Exenterus oriolus*, Htg.; *Campoplex argentatus*, Gr.; *Mesochorus laricis*, Htg.; *Tryphon laricis*, Htg.; *T. impressus*. Gr.; *T. leucostictus*, Rtzb.; *T. lophyrorum*, Htg.; *T. scutellatus*, Htg.; *T. tenthredinum*, Sch.; *Tachina inclusa*, Htg.; *T. bimaculata*, Htg.

I have only seen two specimens taken by myself at Rannoch, where the species was also taken by the late Mr. Hislop.

Continental distribution: Sweden, Germany, France, Russia.

Obs.—According to Stein (l. c.) the *Lophyrus frutetorum*, Fab. (sec. Htg.), is a little known species, the larva of which is distinct and is described and figured by Hartig.

Seventh abdominal segment in front of saw with a triangular incision; broad, wide; for the greater part black. Legs black at base; femora (especially the posterior) more or less black. Antennæ nineteen to twenty-jointed. (species 4, *Pini*.)

4. Lophyrus pini.

Vol. II, Pl. VI, fig. 1, ♀; 1, *a*, *b*, Trophi; 1 *c*, *d*, Ovipositor; 1 *e*, Antennæ of ♀. Vol. II, Pl. XII, fig. 7, Larva; fig. 11, Cocoon.

Tenthredo pini, Lin., S. N., i, 556, 8 (1758); F. Su., 390; Fab., S. E., ii, 112, 28; Walck., Fn. Paris., ii, 37, 14.
Hylotoma pini, Fab., S. P., 22, 7; Fall., Acta, 1807, 198, 3.
— *dorsata*, Fab., Spec. Ins., i, 408, 15
Tenthredo pectinata-major, Retz., De Geer, 74, 317.

Lophyrus pini, Klug, Berl. Mag., vi, 50, 2; Fall., Mon., 14, 3; Lep., Mon., 54, 154; Curt., B. E., ii, pl. liv; Ste., Ill., vii, 21, 1; Dbm., Prod., 86, 26; Htg., Blattw., 141, 9, pl. iii, f. 24, pl. iv, f. 1 (lar.); Voll., Tijd. Ent., i, 180, pl. ii, viii, 71, pl. iv, f. 4 and 5 (lar.); Thoms., Hym. Sc., i, 69, 9; Cam., Fauna, 48, 4; André, Species, i, 59 and 67; Cat., 8,* 9.

Testaceous; head, antennæ, breast, more or less of the mesonotum, and of abdomen above and beneath, black. Legs obscure testaceous; coxæ at base, more or less of four anterior tibiæ and femora, and the posterior femora, except at base and apex, black. Apex of hinder tibiæ fuscous. Wings hyaline; costa and stigma testaceous, the base of the latter black.

♂ black; labrum, palpi, knees, tibiæ, and tarsi, testaceous. Mesonotum strongly punctured.

Length 3½—4 lines.

This is a very variable species. Most of my Scotch-bred specimens have the breast broadly and the mesonotum, scutellum and metanotum, and the greater part of the back of the abdomen, and a considerable part of the underside, black, but lighter varieties are not uncommon. One aberration has the mesonotum testaceous with three black marks, and with this form the scutellum may be entirely black in part, or entirely testaceous. Generally the head is entirely black, but occasionally specimens are found with the mouth pale. The quantity of black on the legs varies, especially on the four anterior, but I have never seen specimens without some black on the posterior femora.

The larva has the head shining, covered with a few hairs, reddish-brown at the back and sides, black in centre of the face except a line a little above the mouth, and which extends across; the eyes are placed in the black part.

The body is whitish-green; is covered with small black dots, which form lines across the body. Over the ventral legs are three black marks, longer than broad, and almost joined to each other. Above there are thirteen squarish black marks, the first of which almost touches the head, and the last pair are much larger than the others. The anal segment is beset with hairs. Spiracles fuscous, almost black. Below the

spiracles the sides are paler. Legs black, paler at the junction of the joints, and there is an oblique white band on either side of the basal joint.

The coloration of the head is very variable; sometimes it is entirely pale green, with the mouth parts brownish; from that it varies through all shades of brown to deep black. I have found a larva with the body nearly entirely green, the black marks along the sides being almost obsolete.

In Scotland I find the larva mostly during July and August, and sometimes in September. The flies appear in June.

Parasites.

Hymenopterous: *Cryptus abscissus*, Rtz.; *C. flavilabris*, Htg.; *C. incertus*, Rtz.; *incubator*, Rtz.; *C. leucomerus*, Rtz.; *C. leucostictus*, Rtz.; *C. nebeculatus.* Gr.; *C. punctatus*, Gr.; *Hemiteles areator*, Gr.; *H. crassiceps*, Rtz.; *H. eryngii*, Rtz.; *Phygadeuon pteronorum*, Htg.; *P. pugnax*, Htg.; *Pezomachus cursitans*, Gr.; *Exenterus succinctus*, Gr.; *Limneria argentata*, Fab.; *Ophion merdarius*, Gr.; *Lissonota breviseta*, Rtz.; *Mesochorus areolaris*, Rtz.; *M. laricis*, Htg.; *M. scutellatus*, Gr.; *Pimpla rufata*, Gr.; *Metopius fuscipennis*, Wesm.; *Campoplex carbonarius*, Rtz.; *C. relectus*, Rtz.; *Eulophus lophyrorum*, Htg.; *Monodontomerus dentipes*, Fab.; *M. obsoletus*, Fab.; *Pteromalus lugens*, Foerster; *P. subfumatus*, Rtz.

Dipterous: *Masicera gilva*, Htg.; *M. flavoscutellata*, Zett.; *M. lophyri*, Desv.; *M. simulans*, Htg.; *Phorocera lata*, Zett.; *Tachina bimaculata*, Htg.; *T. erucastri*, Desv.; *T. inclusa*, Htg.; *T. larvarum*, L.; *Plagia trepida*, Macq.; *Blepharigena trepida*, Mg.

SECTION 2.—*Accessory nervure appendiculated close to the apex. Body smooth, shining, almost impunctate. Abdomen long, cylindrical, the seventh ventral segment entire* (rufus) *or slightly incised* (pallipes). *Claws cleft* (sertiferus) *or simple* (pallipes).

1 (2) Body for the greater part red; claws bifid. *Sertiferus.*
2 (1) Body black; claws simple. *Pallipes.*

5. LOPHYRUS SERTIFERUS.

Pl. II, fig. 2, ♀, 3, ♂; Pl. V, fig. 4, 4 *a*, Larva; fig. 5, Cocoons.

Tenthredo sertifera, Fourc., E. P., ii, 378, 46.
— *juniperi*, Christ, Hym., 432, pl. xlix, f. 4.
— *pectinata-rufa*, Retz., De Geer, 44, 319.
Lophyrus rufus, Klug, Berl. Mag., vi, 53, 3; Fall., Mon., 14, 13; Dbm., Prod., 95, 31; Curt., B. E., ii, pl. liv; Ste., Ill., vii, 21, 3, pl. xxxv, fs. 1 and 2; Htg., Blattw., 164, 14; Thoms., Hym. Sc., i, 64, 11; Voll., Tijd. Entom., iv, 65, pl. i; André, Species, i, 62 and 71; Cat., 9,* 12.
— *piceæ*, Lep., Mon., 56, 160.

Red, smooth, shining, almost impunctate; flagellum, parapsides, metanotum, and more or less of base of abdomen, black; coxæ, trochanters, knees, and base of tibiæ, whitish. Wings hyaline, nervures yellow. Claws with a subapical tooth. Accessory nervure in hind wing appendiculated near the apex. Antennæ 23-jointed.

♂ black, legs and abdomen in the centre beneath red; the basal outer branch of the antennæ (which are 23-jointed) thicker than the others, and curved and elbowed at the base; the apical three straight.

Length 3½ ♂, 7—9 ♀ lines.

A species easily recognised by the smooth almost impunctate body, reddish colour, and by the accessory nervure being appendiculated quite near to the apex. Often there is no black on the abdomen.

The larva has the head deep black, the oral region being also black; sparsely pilose. The body is dirty, pallid, greyish-green, the skin wrinkled, the top of the wrinkles bearing small black, bristle-bearing points,

arranged in single transverse rows, except on the first and last segments, where they are more numerous. Down the back are two broad blackish stripes; over the spiracles is a stripe of a deeper black colour, formed not of a continuous stripe, but of irregular, more or less interrupted, spots; below this is another stripe, also of interrupted spots; and there is a number of black points over and a black mark in front of the claspers. The leg plates are black, shining; the claspers are coloured like the body. With old examples the penultimate segments may be almost entirely black. With young specimens the dorsal stripes are very faint; this being also the case with the second lateral stripe of dots. When full-fed there is only a central dorsal stripe composed of interrupted marks; there are eleven double black marks over the spiracles, and a smaller black mark slightly in front of each spiracle; the oral region is pale. Length 7—9 lines. The colour is somewhat variable, especially in some specimens being of a clearer green than others.

The larvæ are found in May and June; spin up towards the end of June, the flies appearing in August to October, when no doubt the eggs are laid, remaining undeveloped till the following year.

Mr. J. Gardner (E. M. M., xxv, p. 131) states that on the 7th of July, 1885, at Shernton, near Hartlepool, he found the Scotch fir infested with myriads of the larvæ of this species. He says that "every tree was infested with hundreds of larvæ, often two or three batches upon one tree, eating almost exclusively the old or last year's needles, and leaving this year's growth untouched; in some cases where the supply of old needles had fallen short, they had actually gnawed the bark. I noticed one tree that was entirely stripped of the old foliage, not a single needle left! and I did not see a single tree in any part of the plantation that we visited but what was infested with the larvæ." Mr. Gardner further states that according to the testimony of a man who

had been about the woods for many years the larvæ had never been seen in the locality before.

Parasites :—*Diptera : Masicera gilva*, Htg. ; *M. gyrophaga*, Rondani ; *Tachina bimaculata*, Htg. ; *Hymenoptera : Limneria argentata*, Fab. ; *L. carinifrons*, Hlmgr. ; *Mesoleptus evanescens*, Rtz. ; *Paniscus oblongo-punctatus*, Htg. ; *Phygadeuon pteronosum*, Htg. ; *Pimpla angens*, Gr. ; *Tryphon adspersus*, Htg. ; *T. eques*, Htg. ; *T. lophyrorum*, Htg. ; *T. marginatorius*, Fab.

Probably common ; but, except for Hartlepool, I have no definite locality.

Continental distribution : Sweden, Holland, Germany, Russia, France.

6. Lophyrus pallipes.

Vol. II, Pl. VI, fig. 2, ♂.

Hylotoma pallipes, Fall., Acta, 1808, 41.
Lophyrus elongatulus, Klug, Berl. Mag., vi, 55, 5 ; Fall., Mon., 15, 4 ; Htg., Blattw., 169, 14.
— *pallipes*, Dbm., Prod., 97, 33 ; Thoms., Hym. Sc., i, 165, 12 ; André, Species, i, 62, 72 ; Cat., 9,* 15 ; Cam., Fauna, 48, 5.

Black, shining, smooth, head closely punctured ; scutellum with a few scattered punctures ; mesonotum with smaller and fewer punctures ; tegulæ, pronotum, pleuræ, apex, sides, and ventral surface of abdomen and legs, pale testaceous. Wings hyaline, nervures, costa, and stigma, pale testaceous. Antennæ 18-jointed. Claws simple.

The ♂ has the thorax entirely black save occasionally a thin line on the pronotum, the belly is dirty testaceous, the legs pale yellowish, black at the base.

Length 3 lines.

According to the description of Continental writers *pallipes* is variable in the coloration of the thorax, especially in the relative quantities of black and testaceous on it.

The larva is unknown.

Rare. Braemar (Sharp), Rannoch.

Continental distribution : Sweden, Germany, France.

Sub-family—PAMPHILINA.

Antennæ setaceous, 14—37-jointed, the basal joint large. Wings with two radial and four cubital cellules; transverse basal nervure received in the first costal cellule. Abdomen flat, the sides of segments acute. Ovipositor small. Tibiæ spined. Head large, flattish, or semi-globular. Larvæ without abdominal legs.

Prothorax truncated or semi-truncated behind. Middle lobe of mesonotum short, separated from the scutellum by a deep fovea. Clypeus firmly united to the front; its apex truncated or rounded, never incised. Labrum small, inconspicuous. Mandibles large, curved, toothed or not at apex. The third joint of the antennæ is often much longer than any of the others, but is never much thicker than them.

From the preceding sub-families the present is to be known (1) by the larvæ never having ventral legs; (2) by the pronotum being truncated or transverse behind; (3) by the middle lobe of the mesonotum being small, separated widely from the scutellum, which has at its base a large depression; and (4) by the basal nervure being received in the first cubital cellule, or at least is joined to the cubital nervure.

In *Phyllotoma* we find sixteen-jointed antennæ, but its other characters are very different from the *Pamphilina;* in *Hylotoma* are to be seen spined tibiæ, but its antennæ have only three joints; the *Cephidæ* have spined tibiæ as well as multiarticulate antennæ, but the structure of the latter is different, they being much thicker; the prothorax, furthermore, is large, there is only one spur on the anterior tibiæ, and the abdomen is compressed laterally. Finally the *Siricidæ* are to be known from them by the long ovipositor, by the single spur on the anterior tibiæ, &c.

The *Xyelina* agree with the *Pamphilina* in the structure of the thorax, in the basal nervure being united to the cubital, in the larvæ not having ventral legs, and in the spined tibiæ; but differ in the smaller number of

joints in the antennæ, these, too, having the third joint greatly enlarged; and in the large exserted ovipositor.

There are only two European genera. *Pamphilius* with three spines in posterior tibiæ, and with setaceous, simple-jointed antennæ; and *Megalodontes* with two closely situated spines in tibiæ, and antennæ with the joints dentated, and never more than twenty-two in number.

Genus—MEGALODONTES.

Megalodontes, Latr., Hist. Nat. Crust. Ins., iii, 302.
Tarpa, Fab., S. P., 19; Klug, Ent. Mon., 183.

Antennæ 14—22-jointed, short, often with short pectinations on some of the joints; the basal third joint usually large. Head large, somewhat broader than long; trophi greatly elongated; thorax broad, considerably arched on the back. Posterior tibiæ spined. Wings with two radial and four cubital cellules, of which the second and third receive each a recurrent nervure. Lanceolate cellule with an oblique cross nervure. Posterior wings with two middle cellules. Transverse radial nervure received in the second cubital cellule.

The pectinations on the antennæ are usually confined to the middle joints, and are never on the basal three. In length they vary in the different species, and afford excellent specific characters. The head is scarcely so broad as the mesothorax; it is slightly concave behind; broader than long, moderately rounded on the top. The sutures are narrow, and by no means conspicuous, and there are no raised parts on the vertex. Ocelli not forming a triangle, the front one being placed not much in front of posterior; they are situated well forward. Eyes projecting, placed well in front on the sides, not reaching to the base of the mandibles. Between the antennæ the front projects a little; the antennæ originate from a large depression on either side of this. Clypeus amalgamated with the upper part of the head, there being no trace of segmentation; semi-truncated at the apex, broad, labrum small, quadrangular. Mandibles curved, two large sharp teeth at apex. The inner mouth organs are all much lengthened, which makes them not unlike the sucking oral appa-

ratus of bees. The outer lobe of the maxilla is much longer than the inner; the stipes is divided in two; namely, the main piece and a smaller lateral piece to which the palpi are attached, and which is prolonged to the base of the stipes (Vol. II, Pl. VI, fig. 10 *b*). From the top of this piece a horny belt proceeds to the labium, which is thus firmly united to the maxilla. The palpi do not reach much above the top of the long outer lobe of the maxilla. The labial palpi do not reach the top of the lobes of the labium. The thorax is arched on upper side, not much longer than broad; the prosternum projects a little so that the head has considerable powers of movability; the pronotum is broadly rounded behind. The middle lobe of the mesonotum on this account is but slightly developed; the sutures of the lobes are not always very clearly distinguishable; the abdomen has the blotch long, narrow; the abdomen itself is rather flat, but still arched on upper side.

The radial nervure, at the base, issues from the costa a little in front of stigma; the transverse radial from the stigma, joining the radial in such a way that there is no clear point of union, the basal part of the radial nervure, on the other hand, uniting with the transverse at an angle, thus giving the first radial nervure the appearance of being the first cubital, and of there being only one radial cellule; the second radial cellule is round on the lower side; the second angled where the first transverse cubital nervure is received; the second radial cellule receives the other two transverse cubital nervures. The radial cellule has a bordering nervure on upper side from the stigma to where the radial nervure unites with the edge of the wing.

Synopsis of Species.

1 (2) The appendages of antennæ equal in length to two of the joints; antennæ black or testaceous at base. Mesonotum with only two or no yellow marks. *Klugii.*

2 (1) The appendages equal to one of the joints and yellow at the base.
3 (4) The marks on thorax and abdomen clear bright yellow. Mesonotum with four marks. Antennæ 17-jointed, yellow at base; second segment of abdomen marked with yellow. *Cephalotes.*
4 (3) The marks on thorax and abdomen white; mesonotum with two or no marks. Antennæ 15—17-jointed. The base testaceous or black. Second abdominal segment with no marks. *Plagiocephalus.*

1. Megalodontes Klugii.

Tarpa Klugii, Leach, Z. M., iii, 131, 2.
— *spissicornis*, Klug, Ent. Mon., 187, 3; Htg., Blattw., 317, 2; Zad., Schr. Ges. König., vi, 192, pl. iv, f. 22; André, Species, i, 477; Cat., 60,* 23.
— *pectinicornis*, Klug, Ent. Mon., 194, 9.

Black; a triangular mark of variable size between the antennæ, an irregular mark touching the eyes opposite the antennæ, a narrow line on the head behind, and which at the sides curves round and is extended to the posterior orbits of the eyes, more or less of the pronotum, a mark on mesonotum, on either side of scutellum, a broad band on base of abdomen, a spot on the side of second and third and a band on the posterior border of each of the following segments above and on the fourth and fifth beneath, yellow. Antennæ testaceous, often black at base and apex; 17-jointed, the appendages on middle joints double the length of joint. Legs testaceous; the knees, trochanters, and femora more or less (and especially the four anterior), black. Knees, tibiæ, and tarsi with a decided yellowish tinge. Wings subhyaline, a large brownish cloud in the radial and cubital cellules. Nervures testaceous. Length 12 lines.

The coloration is variable; the mandibles are brownish or black, the frontal spots vary in size, the band on vertex may be continuous or interrupted in both sexes, the tegulæ may be yellow wholly or in part or entirely black, the spots on mesonotum may be absent as may be also the lateral spots on the basal two segments of abdomen. The coloration of the antennæ varies also, but the flabellations would appear to be always black. The ♂ has five of the ventral segments yellow; the fourth is much the widest above, this being also the case in the ♀.

The length of the flabellations readily separates *spissicornis* from the other species.

"Britain," Kirby, l.c.

Continental distribution: France, Switzerland, Tyrol, Hungary, Russia, Siberia (Amoor).

2. Megalodontes cephalotes.

Tenthredo cephalotes, Fab., Sp. Ins., i, 408, 14 (1781); Pz., F. G., Heft 62, pls. vii and viii (1799); Coqueb., Ic., pl. iii, f. 8.

Tarpa cephalotes, Fab., S. P., 19, 1; Klug, Berl. Mag., ii, 266, 1; Ent. Mon., 184, 1; Ste., Ill., vii, 96, 1; Htg., Blattw., 316, 1; André, Species, i, 485; Cat., 60,* 24; Zad., Schr. Ges. König., vi, 190, 1.

— *panzeri*, Leach, Z. M., iii, 132; Ste., Ill., vii, 96, 2.

Black; the head with three or more yellow spots; the edge of pronotum more or less, a couple of spots on middle lobe of mesonotum and a pair on the lateral lobes, yellow. Abdomen with the basal three segments marked with yellow at the sides, the succeeding bordered above with yellow, and the fifth and sixth all round. Antennæ 17-jointed, testaceous. The basal five joints yellow; the flabellations equal in length to one of the joints. Legs testaceous, the coxæ, trochanters, and more or less of the base of femora, black. Wings hyaline, a reddish-brown, smoky fascia along the costa. The nervures and stigma testaceous.

Length 10—11 mm.

"Near Bristol but very rare," Stephens, l. c.

Continental distribution: France, Switzerland, Germany, Hungary, Italy.

3. Megalodontes plagiocephalus.

Vol. II, Pl. VI, fig. 10, ♂; 10 *a*, Antenna; 10 *b* and *c*, Trophi; 10 *d*, Leg.

Tarpa plagiocephala, Fab., S. P., 20, 2; Klug, Berl. Mag., ii, 267, 2, pl. vii, f. 1; Ent. Mon., 189, 5; Htg., Blattw., 317, pl. i, fs. 24—31; Zaddach, Schr. Ges. König., vi, 194; André, Species, i, 476; Cat., 60,* 20.

Black; a small mark between the antennæ and two more elongated ones touching each eye opposite the antennæ; a more or less interrupted line on the head behind and extending at the sides to the eyes; a line on the pronotum, sometimes two spots in front of scutellum, the base of abdomen, a broad band on fourth segment, a narrow one on fifth and sixth, and a broader one on the apical segments, white. Antennæ testaceous, darkened towards the apex; sometimes the second

joint is black, the basal joint may also be black or, more rarely, yellowish; 15—17-jointed, the flagellations not longer than one of the joints. Legs testaceous; tibiæ and tarsi paler; the apex of posterior tibiæ and the apices of posterior tarsal joints more or less fuscous; coxæ, trochanters, four anterior femora for the most part and posterior at base, black. Wings brownish, darker in front and having a yellowish tinge.

Length 10 mm.

As with the other species, the colour varies. Generally the markings are white, but occasionally they are (and especially on the abdomen) yellowish. The tegulæ are usually black; there are seldom spots on the sides of the basal segments in the ♀, but one is found usually in the third segment in the ♂, which has also the bands on the fifth and sixth narrower than in the ♀, and has also the ventral segments broadly white; in the ♀ there are usually only two of the ventral segments banded with this colour.

From *cephalotes* (which it resembles in having the flabellations not longer than the joints) it may be known by the white colour of the markings, by the thorax having at the most only two marks, by the second and third segments not having yellow marks at the sides, and by the wings being yellowish-brown almost throughout.

I introduce the species as British on the authority of a specimen in Shuckard's collection bearing a label marked, "from British Collectn., Brit. Mus., Ap. 16/42." It was named "Panzeri," but not on the label itself.

Continental distribution: Germany, Hungary, France, Russia.

Note.—The evidence of the genus being truly British is doubtful, and is of a similar kind to that relating to *Amasis*. See on this point Mr. E. Saunders, E.M.M., xxii, p. 140, and McLachlan, l. c., p. 164. The evidence of the British origin of the genus is based entirely on Leech and Stephens. Undoubtedly some of the species recorded by these authorities have been proved to be erroneous; others (as in the present case) have only been recorded by them, and have never turned up

in Britain, while still others which were recorded by them have been proved, after the lapse of many years by the capture of fresh specimens, to be truly native. The nativity of *Megaladontes* for the present must be regarded as *sub judice;* and on the whole less harm will be done by describing them here, than by their omission.

Genus—PAMPHILIUS.

Pamphilius, Latr., Hist. Nat. Crust. Ins., iii, 303 (1802).
Lyda, Fab., S. P., 43 (1804).
Cephalcia, Pz., F. G., Heft 86, pl. ix (1805).
Cephaleia, Jur., Hymen., 67.
Acanthocnema, Costa, F. N., p. 2, 1860.

Antennæ setaceous, 18—37-jointed, the basal joint long, the third and fourth often lengthened; inserted over the clypeus. Wings with two radial and four cubital cellules; the second cubital cellule receiving the transverse radial nervure; transverse basal nervure received in first radial cellule.

Posterior wings with two middle cellules. Posterior tibiæ with three separated spines. Head and body flat, wide; sides of abdomen acute.

The mandibles are large, curved, and provided with two or three teeth at the apex, the apical tooth being usually large. Clypeus immoveably joined to the upper part of head, often dilated in the middle, rounded at the apex. The basal joint of maxillary palpus shorter than second; third and fourth much larger than that; fifth small, not much longer than second; the apical is the longest. The second joint of the labial palpus is the longest, next is the third, the fourth and basal subequal. In most species the sutures in the vertex are deep and well defined, and may be either parallel or converge more or less in front; the front has often the sutures well defined. Eyes small, oval, not reaching to the base of the mandibles.

Apart from the difference in the number of the joints, the only noteworthy point in regard to the antennæ is that the relative length of the third and fourth joints varies. They may be nearly equal (*inanitus*), or the third may be double or treble the length of fourth (*depressus*, &c.).

The first radial cellule is much shorter than the second owing to the transverse radial nervure originating before the end of the stigma, and being quite straight or directed towards the base of the wings. It is either received before the second transverse cubital nervure and in the second cubital cellule, or is united to the second transverse cubital nervure. The cubital nervure does not extend to the apex of the wing as in *Tenthredo*, &c.; it curves up shortly after receiving the third transverse cubital nervure, and joins the costa nearly on a level with the stigma, uniting with a nervure which surrounds the upper part of the second radial cellule. There is a cross nervure in the costal cellule. The first transverse cubital nervure is received not far from the base of the stigma. The basal is united to the costal at a slight distance from its origin (in the first cubital cellule) in some species (*inanitus*), or may be as in *erythrocephalus* interstitial. Characteristic in some species is the interrupted nervure, which issues from the median nervure a little past its middle (=transverse brachial nervure of Thomson). The transverse median nervure is received not far past the middle. Lanceolate cellule wide; its cross-nervure oblique; the anal nervure dilated upwards in the middle. There is a deep depression at base of scutellum separating it from the rather short middle lobe of the mesonotum. Cenchri large. Blotch in abdomen distinct. Apex of abdomen rounded; abdominal segments acute at the sides, the edge of each projecting in front of the base of the succeeding.

Legs stout, of medium length; sometimes the anterior tibiæ are spined as well as the posterior. Spurs short, stout. The fifth joint of the posterior tarsi is nearly as long as basal.

Ovipositor short, slender; the support broad and sharply angled at base, the apex acute; saw also somewhat sharp at the point, and generally without teeth.

The genus contains more than fifty European

species; it is common in North America, two species are known from Mexico, but none south of that; a few species are found in China and Japan.

It can be arranged into several well-marked groups (sub-genera) by the differences in the form of the head, the structure of the antennæ, and arrangement of spines on the tibiæ, and by the neuration.

SECTION 1.—*Anterior tibiæ with a spine; calcaria bifid, with a small tooth below the apical one; vertex without sutures, or with them very thin; the central region not separated from the sides, but continuous with them. Subcostal nervure furcate beyond the middle, transverse brachial nervure obsolete.*

The first two groups are clearly separated from the rest of the genus by the spines on the front tibiæ, by the obsolete transverse brachial nervure, and by the head wanting sutures on the vertex. Their antennæ, too, are longer, and have more joints (twenty-five to thirty-five) than usual. Although the larvæ structurally do not differ from those of the other species, yet they agree in habits, and especially in being attached exclusively to pines.

In Britain neither group is well represented. On the Continent there are three species of Group I and five of Group II.

I. THE GROUP OF PAMPHILIUS ERYTHROCEPHALUS.

Body blue or violaceous, with the head in ♀ red, wholly or in part. Wings violaceous. Antennæ long, the third joint as long as the following three; 25—32-jointed.

1. Pamphilius erythrocephalus.

Vol. II, Pl. VI, fig. 3, ♂ ; 3 *a*, base of Antenna.

Tenthredo erythrocephala, Lin., S. N., i, 558, 26; F. Sv., 394; Fab., E. S., ii, 121, 66; Pz., F. G., Heft 7, tab. 9; Schaef., Icon., tab. 96, f. 9.

Lyda erythrocephala, Fab., S. P., 43, 1; Klug, Berl. Mag., ii, 280, 16; Lep., Mon., 4, 7; F. Fr., pl. xiv, f. 1; Ste., Ill., vii, 103, 21, pl. xxxviii, f. 4; Htg., Blattw., 326, 1; Thoms., Hym. Sc., i, 300, 2; Br. and Zad., Schr. Ges. König., vi, 119; Cam., Fauna, 48, 1; André, Species, i, 490; Cat., 61,* 4.

Blue, often violaceous; head red, anterior tibiæ, and apex of femora testaceous; apical three-fourths of mandibles black; palpi testaceous; ocelli in a bluish mark. Wings bluish-violaceous, nervures bluish-black; the posterior wings are lighter coloured; the ♂ has the body more densely pilose; the head is blue, except below the antennæ where it is straw-yellow; the mandibles are of the same colour, except at the apex which is black.

Length 6½—7 lines.

Erythrocephalus has no near British ally, but is closely related to the Continental *L. flaviceps*, Retz., which may be known from it by the head being only blue in the centre above; below it is yellow, and behind the eyes, at the sides, reddish-testaceous; the wings are sub-hyaline, and the anterior legs entirely blue. The ♂ has the head entirely black, except the mandibles.

The head of the larva is yellowish, sometimes brownish, and marked with fuscous spots; that of the body olive, often with a greenish tinge, especially on the back; the anal segment more or less yellowish, the legs reddish, black at the base. Each segment is divided by deep depressions into five portions, of which the three upon the dorsal region are marked with transverse greenish-brown or fuscous spots. On the back, commencing on the second segment and ending on the last, is a thin greenish-brown line. There is a similar line on the sides, commencing between the last pair of legs and ending on the twelfth segment. There is a

shining, large, black plate on back of second segment and two smaller ones of the same colour on the sides, while between each pair of legs are two black spots, and another is over each leg.

According to Hartig the larvæ live on *Pinus sylvestris* socially, each in a nest spun of silk by itself, of a roundish form, and about the size of a hazel nut, plentifully garnished with the pellets of frass. Generally the larvæ attach their cocoons to the twigs of last year's growth and as a rule near the ground. There are usually two or three or more larvæ on the same twig. They are found during July and August and pupate in the earth. The eggs are laid in the needles of last year's growth.

Paniscus testaceus, Gr., has been recorded as a parasite.

Rare. "Near Bristol and in the west of England" (Stephens). Rannoch, Pitlochry (A. Beaumont).

Continental distribution: Sweden, Germany, Russia, France, Tyrol, Switzerland.

II. The Group of Stellatus.

Head and thorax black, spotted with yellow; abdomen black at base and in middle, the sides and apex reddish. Antennæ as long as the body, 25—35-jointed; third joint as long as the following two.

2. Pamphilius stellatus.

Pl. II, figs. 6, ♂; 7, ♀.

Tenthredo nemoralis, Lin., S. N., i, 558, 29 (1758); F. Sv., 394?
— *stellata*, Christ, Hym., 457, pl. li, f. 4 (1791).
— *pratensis*, Fab., E. S., ii, 122, 74.
Lyda pratensis, Fab., S. P., 45, 10; Schaef., Icon., pl. xlii, fs. 8, 9; Lep., Mon., 10, 27; Klug, Berl. Mag., ii, 274, 4; Ste., Ill., vii, 96, 5; Htg., Blattw., 329, 333.
— *populi*, Fall., Acta, 1808, 222, 5.
— *stellata*, Br. and Zad., Schr. Ges. König., vi, 113 (1865).
— *nemoralis*, Thoms., Hym. Sc., i, 301; Cam., Fauna, i, 41, 2; André, Species, i, 511; Cat. 60,* 1.

Antennæ reddish, extreme base yellow, scape black. Head black; clypeus; two small marks over antennæ, a large broad mark on either side of the antennæ touching the eyes; the inner edge of this mark is continued round the lower part of the eye into the yellow space at the outside of the eye, which is entirely yellow, and from this the yellow is continued in a thin band all round behind the vertex. On the vertex behind are two small marks, longer than broad, and on either side of these there runs a thin line from the yellow posterior border, and curving round into a club a little in front of the eyes and in front of the above-mentioned marks; mandibles yellowish-testaceous, the apex fuscous; palpi yellow. Prothorax yellow. Mesonotum black; in front is a yellow mark, slightly curved at the base, produced into a blunt point behind; on the lateral lobe is a large yellow mark which is broadest in front; scutellum yellow. Sometimes the lateral mark is continued by a thin line into the mark in middle lobe. Thorax on under side black; the greater part of mesopleura in front yellow, and there are two thin yellow lines on breast which nearly converge in front; metapleuræ for the greater part yellow. Metanotum in front with a transverse yellow mark, which is prolonged and thickened at either side, behind this is a shorter mark of equal breadth throughout. Abdomen black above, the sides, apex, and more or less of the apical segments in the middle reddish-testaceous; ventral surface yellow, black more or less in the middle. Legs: coxæ and trochanters yellow; femora yellowish beneath, testaceous at apex, above broadly banded with black; knees, tibiæ, and tarsi testaceous, the tarsi infuscated at the apices of the joints. Wings hyaline. Nervures ferruginous, costal nervure black in front of stigma.

The ♂ has the upper side of the body almost entirely black and is more pilose than the ♀. The head is yellow on lower side, black above the antennæ, except a few obscure yellow marks as in the ♀, but these may be entirely absent. The yellow mark on the mesopleura is smaller; there is more yellow on the sternum, and the metapleura is mostly black. The mesonotum is entirely black, but sometimes there are two obscure yellow marks on the middle lobe.

Length 6—7 lines.

The yellow marks on head and thorax may be broader or narrow, and the scutellum is sometimes almost entirely black.

Larva: The head is pale fulvous, dotted with blackish points; the antennæ black, banded with yellow. The body olive-green, of a more yellowish tint on the sides. On the second segment is a dark brown, shining, horny spot. On the back is a dark brown longitudinal line, and another of the same colour goes down the sides. Under the last is a clear yellowish stripe. The legs are yellowish, marked with black spots in the centre.

The eggs are laid in the young pine needles, are green in colour, and elongated in shape. The larvæ come out of them in eight days after they are laid.

The larva lives solitary on pines, enveloping the twigs with a covering of silk threads, beneath the shelter of which it lives and feeds.

They are found during July and August, the flies appearing early in June.

Apparently not common, but widely distributed in Scotland and England.

Continental distribution: Sweden, Germany, Russia, Holland, France, Switzerland, Tyrol.

Obs.—I am not quite satisfied that the above species is really the *nemoralis*, Lin., and I have therefore not adopted the name. In the Linnæan Collection *nemoralis* is represented by *Nematus fallax*; it is not, however, the original type, but one inserted by Sir J. E. Smith on the strength of his own identification. Zaddach (l. c., p. 151) refers it (and I believe rightly) to *punctata*, F.

SECTION 2.—*Anterior tibiæ without a spine. Sutures on vertex deep, so that the central part is distinctly separated from the sides and more or less from the front. Claws bifid. Transverse brachial nervure present.*

I. THE GROUP OF FLAVIVENTRIS.

Head, thorax, and abdomen black above, the sides, legs, and more or less of face, yellow. Antennæ 24-jointed, third joint as long as the three following united. Sutures on vertex not very deep or distinct; head between antennæ projecting, bluntly keeled. Subcostal nervure broken off beyond the transverse costal nervure. Stigma black. Wings usually with a smoky fascia in the middle.

This is a very distinct group, and is, to some extent, intermediate between Sections 1 and 2, inasmuch as the sutures on vertex are not so well developed as in the following groups; yet still the lateral furrows are clearly enough defined. The wedge-shaped form of the front is peculiar, as is also the manner in which the subcostal nervure is broken off beyond the middle.

The larvæ of the four known species referred to this group feed socially on fruit trees (*Prunus*, &c.)

3. Pamphilius flaviventris.

Vol. II, Pl. XXVII, fig. 9, Cerci; 9 *a*, Ant.; 9 *b*, Labium. Vol. II, Pl. VI, fig. 5, ♀; 5 *a*, Antenna at base. Vol. II, Pl. XII, fig. 12, Larva; 12 *a*, Head; 12 *b*, Cerci after Vollenhoven.

Tenthredo flaviventris, Retz., De Geer, 74, 312 (1783).
— *pyri*, Schrank, Fauna Boica, ii, 255 (1802).
— *lutescens*, Pz., F. G., Heft 107, pl. vii.
Lyda clypeata, Klug, Berl. Mag., ii, 279, 14 (1807); Htg., Blattw., 344, 15.
— *sylvatica*, Newman, Ent. Mag., i, 313, pl. i, f. 4 (lar.).
— *flaviventris*, Fall., Acta, 1808, 223; Thoms., Hym. Sc., i, 306, 9; Ste., Ill., vii, 101, 17; André, Species, i, 516; Cat., 64,* 33.
— *albifrons*, Fall., l. c., 225.
— *fasciata*, Curt., B. E., viii, pl. ccclxxxi; Ste., Ill., vii, 102, 20.
— *pyri*, Zad., Schr. Ges. König, vi, 147.

Black; head and mesopleuræ coarsely punctured; a large wedge-shaped mark between the antennæ (extending from the clypeus to a little above the antennæ); base of antennæ, tegulæ, and legs, straw-yellow; abdomen fulvous at apex, the sides with a triangular yellow mark in each segment, and which become larger towards the apex; ventral segments banded with yellow. The coxæ and four posterior femora black at base. Wings hyaline; a broad smoky fascia below the stigma, which with the nervures are black. Generally there is a small yellow spot on the inner side of the eyes above, but this is sometimes absent. The palpi and mandibles are yellow, the apex of the latter piceous. Length 4—5 lines.

The ♂ has the head below the antennæ yellow, the flagellum reddish beneath, fuscous above at base and the abdomen from the second segment is reddish-yellow.

The larva is yellow, sometimes orange-red, with a shining black head and thoracic plates. It lives on pear, plum, and cherry trees, also on the white thorn, *Mespilus*, and other rosaceous shrubs, feeding with many others under the shelter of a common web in June and July.

Parasites: *Ophion mercator*, Gr.; *O. mixtus*, Gr.; *Tryphon armillatorius*, Gr.

Probably common in gardens in England. I have not found it in Scotland.

Continental distribution: Sweden, Germany, Holland, Italy.

II. The Group of Sylvarum.

Head and thorax pale ochreous, with numerous black spots; metathorax and abdomen black above. Antennæ 19-jointed, shorter than abdomen, third joint a little longer than two following united. Head broader than thorax. Lateral sutures on vertex very deep and broad, reaching to the antennæ; transverse suture not so broad nor so deep but still clearly defined.

This is a group of small extent. It is well defined by the broad and flat head, short antennæ, and by the pale ochreous head and thorax, which bear more black markings than any other species, and by the fulvous tinted wings. The species appears to be rare.

4. Pamphilius sylvarum.

Vol. II, Pl. VI, fig. 4, ♀; 4 *a*, Base of Antennæ; 4 *b*, Mandibles.

Lyda sylvarum, Ste., Ill., vii, 100 (1836).
— *fulvipennis*, Br. and Zad., Schr. Ges. König., vi, 155, pl. iv, fs. 14 and 15; André, Species, i, 506; Cat., 64,* 30.
Pamphilius sylvarum, Kirby, List of Hym., 336, pl. xiii, f. 6.

Antennæ 19-jointed, shorter than abdomen; the third joint as long as the following two; basal joints black above, yellow beneath; basal half of flagellum reddish-testaceous, the apical black above, brownish beneath. Head pale ochreous, sparsely covered with broad punctures, a broad mark below each antenna, a small mark below and surrounding the lower ocellus, a large irregular mark on either side of this and three irregular marks on vertex (of which the central is the larger) black. Pronotum and mesonotum pale ochreous, the basal half of middle lobe, a round large mark on lateral touching the tegulæ, two small marks in front of scutellum, base of scutellum and the posterior and lateral borders, black. Metanotum black. Mesopleuræ pale ochreous; a black mark beneath the wings, and the pectus is more or less black. Abdomen black above, the edges, apex, and ventral surface pallid yellow, the ventral surface marked with black. Coxæ, trochanters, and femora pallid yellow, the latter broadly black behind; tibiæ and tarsi testaceous. Wings yellow-hyaline, the apex clear, nervures yellow, stigma with a reddish tint, ♀.
Length 4 lines.

A rare species: Darenth (Stephens), Burnt Wood, Staffordshire (Mr. Joseph Chappell).
Continental distribution: Germany.

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III. The Group of Betulæ.

Body orange; thorax and apex of abdomen black. Wings yellowish-hyaline, with a smoky fascia in the middle; the stigma testaceous. Antennæ long, 23—28-jointed; third joint a little longer than the following two united. Face slightly keeled. Scutellum convex in centre.

One of the best defined groups in the genus.

5. Pamphilius betulæ.

Pl. II, fig. 8, ♀.

Tenthredo betulæ, Lin., S. N., i, 509, 32; F. Sv., 394; Fab., E. S., ii, 122, 72.
— *fulva*, Retz., De Geer, 74, 321.
Cephalcia betulæ, Pz., F. G., Heft 87, pl. xviii.
Lyda betulæ, Fab., S. P., 44, 8; Klug, Berl. Mag., ii, 276, 8; Lep., Mon., 12, 33; Ste., Ill., vii, 102, 18, pl. xxxv, f. 3; Fall., Acta, 1808, 220, 2; Htg., Blattw., 334, 5; Thoms., Hym. Sc., i, 307, 11; Br. and Zad., Schr. Ges. König., vi, 176; André, Species, i, 508, pl. xxii, f. 1; Cat., 63,* 27.
— *aurata*, Klug, l. c., 275, 6, pl. vii, f. 3; Ste., Ill., vii, 101, 15; Lep., Mon., 10, 29.

Orange-yellow; meso-, metathorax, and apex of abdomen, black, ocelli in a black spot. Wings hyaline, a violet-black cloud between the first recurrent nervure and the fourth transverse cubital; the cloud in the posterior wings extends to the apex; nervures, costa, and stigma, pale orange-yellow; the legs are yellower than the body; mandibles black at apex.

The ♂ has the cloud in the wings much fainter than in the ♀.

Length 8—8½ lines.

Birch wood, Devonshire (Stephens).

Continental distribution: Sweden, Germany, Russia, France, Spain, Italy.

IV. The Group of Sylvaticus.

Head and body violet-black, head and thorax marked with yellow. Antennæ and legs yellow, black at the base, 23—31-jointed, the third joint not much longer than fourth. Face slightly keeled. Wings hyaline, stigma black, paler at apex.

A group easily recognised by the violet-black body, yellow scutellum, legs and antennæ.

7. Pamphilius sylvaticus.

Pl. IV, fig. 7.

Tenthredo sylvatica, Lin., S. N., i, 558, 28; F. Sv., 394, after Brischke.
— *nemorum*, Fab., E. S., ii, 111, 24.
— *fulvipes*, Retz., De Geer, 74, 323.
Lyda nemorum, Fab., S. P., 45.
— *sylvatica*, Klug, Berl. Mag., ii, 276, 8; Fall., Acta, 1808, 221, 3; Lep., F. Fr., pl. xiv, f. 2; Mon., 9, 26; Ste., Ill., vii, 97, 1; Htg., Blattw., 347, 21; Br. and Zad., Schr. Ges. König., vi, 180, 44; Thoms., Hym. Sc. i, 307, 12; Cam., Fauna, 48, 3; André, Species, i, 510; Cat., 63,* 26.
— *fulvipennis*, Curt., B. E., viii, fol. 381, p. 2; Ste., Ill., vii, 98, 4.
— *stigma*, Ste., Ill., vii, 97, 2.

Black; antennæ testaceous; two marks on vertex, the first and smallest close to the eye; tegulæ, edge of pronotum, two small marks in front of mesonotum, scutellum and legs, straw-yellow; coxæ, trochanters, and base of femora, black. Wings hyaline. Stigma black.

The ♂ has the scape obscure yellow below, black above, and the marks on vertex and mesonotum are smaller.

Length 4—5 lines.

The larva was bred from *Pyrus aucuparia* by Brischke. The leaf is rolled down on either side, or the three upper leaflets are spun together, the larva living between them. It is clear bluish-green, darker on the back through the food shining through. On the underside of the anterior segments are, on each side, a black streak reaching to the first pair of legs; the spiracles are clear bluish-yellow, cerci brownish at the point. Head very shining, reddish-brown, antennæ clear reddish-brown with yellow rings at apex of clypeus, and the lower parts of the face, a spot on front and one on the vertex leading to the neck, black. (Beob. ü. Blattw. (2), 124, Taf. viii, fig. 10.)

Brischke earlier bred it from a larva which rolled the leaves of *Salix capræa* and *Populus tremula*. The larva from the latter had a bright green-ground colour, darker on the back, there was a black streak on the thorax as in the larva just described, the head shining black, with bright reddish-brown vertex, and the antennæ were brown, ringed with black. The *Salix*

larva had a brighter and somewhat broader head, and the antennæ were white. De Geer, who correctly described the imago, states that the larva feeds on *Prunus padus*.

Not common, Clydesdale, Thornhill, London district, Devonshire (Stephens).

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Italy, Russia.

V. The Group of Inanitus.

Head black; behind the eyes and below the antennæ yellow; thorax black, except pronotum; abdomen black, broadly fulvous in middle. Legs straw-yellow. Sutures on vertex deep, the lateral going down to antennæ; the ocelli with a furrow before and behind, and from the former a furrow proceeds to the middle of front. Head between the antennæ slightly carinated. Antennæ 21-jointed, yellow at the base, the rest testaceous; third joint not much longer than fourth.

The yellow and black stigma, the antennæ yellow at base, and with the third joint not much longer than the fourth, readily separate this from some of the species of the *depressus* group, with which it has a general resemblance in coloration.

6. Pamphilius inanitus.

Vol. II, Pl. VI, fig. 6, ♀; 6 *a*, Base of Antenna; 6 *b*, Leg. Vol. II, Pl. XII, fig. 13, Case of Larva after Westwood.

Tenthredo inanita, Vill., E. L., iii, 125, 137, pl. vii, f. 11 (1789).
Lyda inanis, Klug, Berl. Mag., ii, 278, 13; Htg., Blattw., 347, 22; Thoms., Hym. Sc., i, 308, 13.
— *inanita*, Lep., F. Fr., pl. xiv, f. 6; Mon., 12, 35; Ste., Ill., vii, 100, 12; André, Species, 499, pl. xxii, f. 6; Cat., 62,* 25; Giraud, Verh. z.-b. Ges. Wien, 1861, 90.
— *fallax*, Lep., Mon., 13, 37.

Black, shining; the face below the antennæ, a large curved fascia behind each eye, extending to the edge of the head behind and becoming narrower as it does so. Tegulæ and edge of pronotum yellow; the second to fifth abdominal segments fulvous; the apical segment yellow; legs yellow, the apex of tibiæ and tarsi with a ferruginous tinge.

Antennæ yellow at base, the rest black, more or less testaceous beneath. Wings hyaline. Nervures blackish; stigma testaceous; the apex black.

The ♂ has the head for the greater part yellow beneath, entirely black above; the breast is for the most part yellow, as is also the ventral surface; the basal two or three segments are black above, and the apical three or four segments are fulvous, like the middle segments.

Length 5 lines.

A widely distributed species, found frequently in gardens. The larva lives on roses, on the leaves of which it forms a portable case, not unlike that made by the Caddice worms. According to Giraud (l. c.) the case "forms a somewhat conical tube, open at both ends; its length varies according to the age of the larva, and sometimes is 5 cm. It is formed of a variable number of straight and longish folds, detached from the edge of the leaf, rolled in a spiral, and imbricated the one on the other in such a way that the border of the fold formed by that of the leaf is found always above and beneath, while the opposite edge, which is without asperities, is found more directly in connection with the larva. Some silken threads serve to fix all the spirals together. As the larva grows, it lengthens its tube by adding to it a fresh piece, enlarging it at the same time. It is in this protecting tube that the larva lives, entirely hidden, except when it wishes to search for its food or change its position. In the first case, it releases the half or the three-fourths of its body to reach the part of the leaf it wishes to devour. Should it wish to reach a neighbouring point, it detaches itself from the sack so that only the anal extremity remains attached to it; it throws then some silken threads between the orifice of the sack and the point it wishes to attain; then fixing its feet on this point, it brings back quickly its body along with the tube, surmounting thus all the obstacles that might result from the interlacing of the leaves and the tube. This progression, although laborious, nevertheless not only enables it to change from one leaf to another, but even from branch to branch. Like all its allies it is very timid, the least movement frightening it and making it re-

treat precipitously into its shelter." When complete, the case contains about ten spirals, and the upper surface of the leaf is always placed outwardly. The case may frequently (especially when on the large-leaved roses) remain attached to the leaf and keep green like it.

The pupa state is passed in the earth in a little cell.

Giraud mentions that *Odynerus spiricornis*, Spin., stores its nests with the larva of *inanitus*.

Continental distribution: Sweden, Germany, Austria, Russia, France.

VI. The Group of Depressus.

Head and thorax black, spotted with yellow marks, rarely entirely black. Abdomen black at base and apex, fulvous in centre, rarely fulvous at apex. Legs straw-yellow, the tarsi with a reddish tint. Antennæ 19—23-jointed, the third joint as long, rarely shorter, than following two united; the scape black above, yellow beneath; basal half of flagellum reddish, the apical black above. Wings hyaline, stigma yellow or partly fuscous.

The species agree together closely in form and coloration, the only difference being that some species have fewer or no marks in the head, and in one species the abdomen becomes for the greater part fulvous, while the stigma is yellow, fuscous or black. Structurally the antennæ differ in one or two species, having the third joint shorter than the following two joints, and thus approach the group of *inanitus*, but as these differ from the latter in some respects and agree with *depressus* in other characters, they are most naturally placed in this section. Zaddach forms a separate group for *Pamphilius hortorum*, but I have not followed him in this as the latter merely differs in the head having the yellow marks obsolete or much reduced, and in the stigma being blackish; but *P. arbustorum* forms a connecting link in this respect.

The larvæ, so far as is known, are solitary and live in rolled-down leaves (alder-rose).

1 (2) Third joint of antennæ not much longer than fourth. *Arbustorum.*
2 (1) Third joint of antennæ double the length of fourth.
3 (6) Stigma fuscous or black, pleuræ immaculate.
4 (5) A longish curved mark on either side of the vertex; abdomen fulvous in the middle only. Stigma fuscous. *Cingulatus.*
5 (4) A small mark on vertex touching the eye; abdomen with segments 3—5 entirely fulvous. Stigma blackish. *Hortorum.*
6 (3) Stigma yellowish, pleuræ marked with yellow.
7 (8) Front rugosely punctured, no mark over antennæ; abdomen mostly violet-black. *Pallipes.*
8 (7) Front not rugosely punctured; two marks over antennæ; abdomen broadly fulvous. *Depressus.*

8. Pamphilius arbustorum.

Vol. II, Pl. VI, fig. 7, ♀ ; 7 *a*, Base of Antenna.

Tenthredo lucorum, Fab., S. E., ii, 324, 41.
— *arbustorum*, Fab., E. S., ii, 123, 78.
Lyda arbustorum, Fab., S. P., 46, 15; Klug, Berl. Mag., ii, 282, 19; Zad., Schr. Ges. König., vi, 173; Thoms., Hym. Sc., i, 308; Cam., Fauna, 48, 4; André, Species, i, 497; Cat., 62,* 11.
— *stramineipes*, Htg., Blattw., 347, 23; Zad., Schr. Ges. König., vi, 160; André, Species, i, 501; Cat., 62,* 22.

Antennæ not much longer than abdomen, scape black, the rest of the joints black, those near the scape brownish on underside; the third joint a little shorter than the second, and not much longer than the fourth and fifth together. Head black, a line on clypeus, mandibles at base, a broad fascia proceeding from the inner side of the eyes to back of head, where it becomes broader, and a narrow stripe along the sutures on vertex, yellow. Behind the ocelli the head is smooth, shining, with only a few shallow scattered punctures; below them it is more strongly and more numerously punctured, and is not so shining. Thorax black, shining; tegulæ, the base of pronotum, scutellum, and post-scutellum, yellow. Abdomen black above, the third and fourth, and part of fifth, and apical segments, fulvous, the sides and ventral surface yellow. Legs straw-yellow, coxæ black at base, tarsi reddish-yellow. Wings hyaline, stigma fuscous, paler in the middle.
Length 5 lines.

The short third joint of the antennæ separates easily this species from the others of the group.

The larva is unknown, but Saxesen (Zaddach, l. c.) suspect that it feeds on rose. My specimens were

found also on rose, and possibly it is its larva which is figured on Pl. XII, figs. 8 and 10, Vol. II.

Rare. Rannoch in June.

Continental distribution : Sweden, Germany, France.

9. Pamphilius depressus.

Vol. II, Pl. VI, fig. 8, Sheath of Ovipositor. Vol. III, Pl. II, figs. 9 and 10 (var. *albo-pictus*).

Tenthredo depressa, Vill., E. L., iii, 124, 31 (1779); Pz., F. G., Heft 65, pl. xi (1793).
Lyda depressa, Klug, Berl. Mag., ii, 274, 5; Lep., Mon., 11, 32; Ste., Ill., vii, 101, 16; Htg., Blattw., 346, 20; Br. and Zad., Schr. Ges. König., vi, 157, 23; Thoms., Hym. Sc., i, 312, 19; Cam., Fauna, 49, 5; André, Species, i, 502; Pl. xxii, fs. 5 and 8; Cat., 63,* 28.
— *vafra*, Zett., Ins. Lap., 355, 3.
— *albopicta*, Thoms., Hym. Sc., i, 312, 20.

Antennæ brownish, darker above and at the apex; basal two joints black, the second yellowish beneath; third joint longer than basal joint, and than the fourth and fifth together. Head coarsely punctured below the vertex, the greater part of the face below the antennæ, the sides behind, the lower half of the eyes broadly, the inner orbits narrowly (the yellow or inner orbits continued across the vertex to the back where it joins the yellow, which is prolonged from the outer orbits so that thus a large black space is surrounded by yellow behind the eye), two fasciæ along the lateral sutures on vertex, and a small mark at outer side of antennæ, yellow. Thorax black; tegulæ, pronotum, a broad fascia on mesonotum in front, scutellum, and post-scutellum, yellow. Abdomen black at the base and narrowly at the sides, the rest reddish, underside yellow. Legs yellow, the tarsi testaceous. Wings hyaline, nervures blackish, stigma testaceous.

The ♂ has the face below the antennæ, the mandibles, except at apex, and the basal joints of antennæ beneath, yellow; the fasciæ on vertex are generally obsolete.

Length 5—6 lines.

A somewhat variable species in the amount of yellow colour on the head and thorax and of the fulvous on the abdomen; the intensity of the punctuation on the head also varies. The *P. albo-pictus*, Thoms., seems to be a variety of *depressus*, chiefly differing from the type in the greater amount of white on the pleuræ,

and in the lateral lobes of mesonotum being marked with white. I have a specimen from Kingussie.

The larva is clear grass-green; on the back is a small darker line, and there is a yellowish lateral line. The head is shining green with black eye-spots, and with three black points on the vertex; mouth brown. On the upper part of the second segment are two small black marks, and on the side are two longer ones. Above each leg is a shining black mark. When young the body has a more yellowish tinge, and the head and second segment, as well as the anal lobe, are black.

It lives in the folded-down leaves of the alder, the edge of a leaf being rolled down into a tube, the roll being kept together by means of silk threads. Inside of this the larva lives, only coming out of it to feed. The larvæ feed during July, the flies appearing in May and early in June.

Common in Scotland, apparently rarer in England, but still widely distributed.

Continental distribution: Sweden, Germany, Russia, Holland, France, Switzerland.

10. Pamphilius pallipes.

Lyda pallipes, Zett., Ins. Lapp., 355, 4; Thoms., Hym. Sc., i, 311, 3; André, Species, i, 505; Cat., 62,* 21.
— *flavipes*, Zett., Ins. Lapp., 355, 5.
— *variegata*, Zad., Schr. Ges. König., vi, 161.

Black; the apex of clypeus, mandibles, except the apices, which are brownish; a large mark on the outer orbit of the eye, a smaller one on inner side, four curved fasciæ on the vertex (the inner not half the size of outer), tegulæ, the edge of the pronotum behind, and broadest at tegulæ; a broad triangular mark on middle lobe of mesonotum, scutellum, post-scutellum; a large mark on mesopleuræ, a smaller one on metapleuræ over the hind coxæ; legs, the apex of abdomen, and the edges of the segments on ventral surface, and more narrowly above, yellow; the middle of abdomen above is obscure rufous; the coxæ at base are black; hind tarsi faintly fuscous. Wings yellowish-hyaline, stigma brownish-red. Antennæ obscure, brownish-red; scape black, yellow beneath. Vertex with large scattered punctures, below the antennæ rugose; clypeus punctured like the vertex. Mesonotum with scattered punctures. Lateral sutures on vertex almost parallel, an

indistinct central one, a more distinct transverse one, in front of the ocelli.

The ♂ has only the outer mark on the vertex, none on the thorax; the belly has more yellow, the anal appendages fulvous, and, if anything, the head is more strongly punctured. Apical segment above deeply, somewhat triangularly, incised, the white membranous part depressed, slightly incised at apex. Stigma fuscous.

Length 5 lines.

The strongly punctured, opaque rugose front distinguishes readily this species. In addition the fact of their being no white or yellow marks over the antennæ, and the abdomen being only obscure fulvous in the middle, serves further to distinguish it. The black clypeus and the fuscous border of *cingulatus* enables that species to be known from it.

Rare. Pitlochry (Alfred Beaumont); near Hastings (Bloomfield).

Continental distribution: Sweden, Germany.

Note.—Kirby (List of Hym. i, 338, 33) records *P. latifrons*, Fall., = *maculosus*, Zad., as British; but the specimen he refers to *latifrons* is not that species, nor apparently is it any I have described. It is black; a line along the vertical sutures, one running to the eyes; two marks over the antennæ, an oblique one on either side of this; a mark on clypeus; one on mesonotum, the scutellum, tegulæ and legs, clear yellow. Abdomen black, yellow spotted along the edges; the fourth segment, two marks on fifth and anus, fulvous. Antennæ fuscous, the base of flagellum fulvous, the scape yellow; the third joint more than twice the length of the fourth. Wings hyaline; stigma pale yellow. Vertex impunctate; clypeus punctured, keeled in the middle; mesonotum almost impunctate.

The species I have been unable to satisfactorily determine.

P. latifrons, it may be added, differs from *P. pallipes* and *P. depressus* in the latter having the third joint more than treble the length of the fourth; while it has it barely double the length.

11. Pamphilius cingulatus.

Pamphilius cingulatus, Latr., Enc. Méth., viii, 690, 15 (1811).
Lyda cingulata, Lep., Mon., 9; Ste., Ill., vii, 100, 11.
— *suffusa*, Htg., Blattw., 345, 19; Thoms., Hym. Sc., i, 313.
— *balteata*, Br. and Zad., Schr. Ges. König., vi, 163; André, Species, i, 500; Cat., 62,* 13.

Black; head coarsely punctured, the vertex not so strongly as the front, mandibles yellow at base, the apex piceous, a broad yellow band on each side of vertex; antennæ with the basal two joints black, the rest black above, pale brown on lower side, third joint nearly as long as the following three. Tegulæ, the edge of pronotum, scutellum, post-scutellum and legs, straw-yellow, base of coxæ black. Abdomen black, the middle two segments fulvous in centre. The edges of the segments slightly, and the ventral segments bordered with black. Wings hyaline, stigma fuscous, paler in the centre.

The ♂ has the scutellum black.

Length 4½ lines.

This is perhaps only a variety of *P. hortorum;* the vertex, however, is less strongly punctured; there are two conspicuous white marks on vertex, the stigma is lighter in tint, especially in the middle, and the centre only of the abdomen is fulvous, not the two middle segments as in *hortorum*. The ♂, too, differs from the ♂ of *hortorum* in having the scutellum black.

Rare. Braemar.

Continental distribution: Sweden, Germany, France.

12. Pamphilius hortorum.

Lyda hortorum, Klug, Berl. Mag., ii, 278, 12 (1807); Herr. Schäff., Deutschl. Ins., Heft 119, pl. ix; Htg., Blattw., 345, 17; Ste., Ill., vii, 99, 9; Br. and Zad., Schr. Ges. König., vi, 169; André, Species, i, 510; Cat., 62,* 12.
— *balteata*, Fall., Acta, 1808, 225, 9; Thoms., Hym. Sc., i, 314.

Black; head strongly punctured, antennæ testaceous; base and apex black, abdomen with the third and fifth segments fulvous; scutellum, post-scutellum, and legs straw-yellow; apex of tibiæ and tarsi more obscure; mandibles testaceous. Wings hyaline, stigma blackish.

The ♂ has the apical two thirds of the abdomen fulvous, the edges of the segments slightly bordered with black, the apical margin of the

clypeus is yellow, the base of pronotum, tegulæ, scutellum and post-scutellum, yellow.
Long, 5½ lines.

Rare. New Galloway, Combe Wood and Hertford (Stephens, l. c.).

Sub-family—XYELINA.

Antennæ 9- to 12-jointed, the third much longer and thicker than any of the others. Wings with three radial and four cubital cellules. Transverse nervure received in first cubital cellule. Posterior wings with two or three middle cellules. Two posterior tibiæ spined. Ovipositor longer than half the length of the abdomen. Prothorax transverse. Middle lobe of mesonotum short, triangular, widely separated from scutellum. Larva without ventral legs.

As already remarked (p. 84) the affinities of this sub-family are clearly with *Pamphilius*, as is shown by the not dissimilar arrangement of the cubital nervures, by the structure of the thorax, the spined tibiæ, &c., but the very remarkable antennæ and palpi, the extra radial cellule and the long ovipositor sufficiently differentiate it from all the other sub-families of *Tenthredinidæ*. The curious genus *Blasticotoma*, Klug, has certain affinities with it, and like it has the third joint of the antennæ very large and thick; but there are only four joints in all; there are no spines on the tibiæ, and there are only two radial and three cubital cellules.

Only two genera of *Xyelina* have been described—*Xyela* and *Macroxyela*—the former with twelve-jointed antennæ and two middle cellules in hind wings, the latter with only nine joints in the antennæ and three middle cellules in the hind wings. *Xyela* contains at present only six European and one North American species. *Macroxyela* is exclusively American.

Genus—XYELA.

Xyela, Dalm., Acta Holm., xl, 122 (1819); Htg., Blattw., 349.
Pinicola, Breb., Nouv. Bull. Soc. Philom., 1818, p. 116. (This name is pre-occupied.)

Antennæ 12-jointed, inserted over the clypeus. Second and third cubital nervures receiving each a recurrent nervure. Lanceolate cellule with an oblique cross nervure. Posterior wings with two middle cellules.

The first joint of the antennæ has a short pedicle at its base, reckoned by Westwood a true joint (cf. Int., ii, p. 110), and is about four times longer than the small second, being also thicker than it; the third is nearly as long as all the succeeding nine joints united, which are slender. Eyes not roundish, situated at a distance from the base of the mandibles. Clypeus slightly dilated, almost transverse at apex. Mandibles dissimilar; the right with a long curved apical tooth, followed by two shorter and blunter ones with rounder edges, and behind there is a large broad dilatation, with a small incision in the apex; the left wants this projection, and has the two subapical teeth shorter. Maxillary palpi six-jointed; basal joint short, second much longer, third longer than the first and second together, fourth the longest, fifth shorter, longer than second, elbowed at its apex and succeeded by two smaller.

The ovipositor does not differ in its fundamental structure from that of the true sawflies. The ovipositor proper is membranous, broad, thin, without teeth, but the apex is somewhat striated. The support is pilose on the outer side; its apical piece is more than double the length of the basal; the triangular plate is firmly attached to it.

In the wings the costal cellule is large and has a cross nervure. The radial nervure originates from the base of the stigma, and is much angled where the nervures are received; the first transverse radial nervure is straight and issues from near the middle of

stigma, the second is oblique and looks like the continuation of the radial nervure. The cubital nervure issues close to the middle of the costa; it is much longer and narrower than any of the others and at the bottom is curved, loop-shaped, extending to the base of stigma, the first transverse cubital nervure being received at extreme base of first radial cellule and continuous with the radial nervure. The three other cubital cellules are of the normal shape and are angled where the recurrent nervures are received (in the second and third). The transverse basal nervure is received in the basal third of its cellule; the transverse median near the end of the lanceolate cellule, the third discoidal cellule being small, six-angled, not much longer than broad.

1. Xyela Julii.

Vol. II, Pl. VI, fig. 11, ♂; 11 *a*, Antenna; 11 *b*, Ovipositor; 11 *c*, Mandibles; 11 *d*, Maxillary Palpus.

Pinicola Julii, Brebisson, Nouv. Bull. Soc. Philom., 1818, 116; André, Species, i, 468, pl. xxii, fs. 11—15; Cat., 59,* 1.

Xyela pusilla, Dalm., Acta, 1819, 124, pl. vi, fs.. 1—11; id., Anal. Ent., 28; Htg., Blattw., 352, 1; Thoms., Hym. Sc., i, 316, 1; Ste., Ill., vii, 109; Cam., Fauna, 49, 1.

Fuscous or black; the mouth, palpi, orbits of the eyes, and some irregularly defined spots on thorax, legs and terebra, pale yellow, a line on the femora fuscous; the sides and ventral surface of abdomen often fuscous; basal joints of antennæ fuscous. Wings hyaline, nervures milk white. The transverse basal nervure is received in the first cubital cellule; the median cellule is much longer than broad, and has the transverse median nervure received close to apical third of cellule. The terebra is slightly curved, and is about as long as the abdomen.

Length 1½—2 lines.

In the lighter coloured examples the head is pale yellow save two or three marks on front and vertex; in the darker coloured specimens the vertex and front may be almost entirely black, as may be also the thorax. The other European species differ from

Julii either by having the transverse basal nervure interstitial (in which case the terebra is as long as the body) or by the terebra being shorter than the abdomen.

South of Scotland, Hertford, Norfolk (Stephens), Worcester (Fletcher), Glanvilles Wooton (Dale).

Continental distribution: Sweden, Germany, France.

Family CEPHIDÆ.

Antennæ thickened towards the apex, rarely filiform, 18- to 30-jointed. Labium three-lobed; labial palpi 4-, maxillary 6-jointed, long. Tibiæ spined. Anterior tibiæ with only one spur. Pronotum long, nearly as long as the mesonotum; middle lobe of mesonotum small, broader than long, not reaching the scutellum. Cenchri hidden. Abdomen compressed; ovipositor projecting, nearly one-half longer than the last segment. Wings with the first cubital cellule short.

The larvæ are footless, except six tubercle-like thoracic legs, white and fleshy and provided at the anus with a projecting point, which may be capable of being retracted telescopically. They are white, have horny, strongly built heads, and very powerful jaws. According to Riley (Insect Life, i, p. 10) they have placed rather near to the small eyes (at least *Cephus* (*Phyllœcus*) *integer*, Norton) extremely small six- to seven-jointed antennæ, the basal three joints being the stoutest; the antennæ in *C. pygmæus* are stated by Curtis to be four-jointed. They are internal feeders, feeding usually on the pith of the plant. *Cephus compressus*, Fab., lives in the buds of the pear; *C. abdominalis* feeds on the flowering buds of fruit trees, or, according to Audouin (cf. Westwood, Int., ii, p. 112) in the young slender shoots of the pear; *C. phtisicus* in the branches of the rose; *C. xanthostoma*, Eversmann, in the stem of *Spiræa ulmaria*; *C. linearis* in the common reed; another species is described by Perris as feeding in the bramble; *C. femoralis* in the stems of willows and oak; and *C. pygmæus* in corn; and in America *C. integer*, Norton, in willow

shoots. Some of the species (especially the latter two) are injurious to the plants on which they feed, and frequently do very great damage.

The systematic position of the *Cephidæ* has been much discussed. By Linné, Fabricius, Klug, and some of the older authors, they were relegated to the *Siricidæ*, and this is also the position assigned to them by Hartig; by Curtis, Westwood and Thomson, they are placed with the *Tenthredinidæ*, while Foerster and André regard them as forming a distinct family. So far as the form of the larvæ goes it affords no noteworthy clue as to what family *Cephus* belongs, for it does not differ essentially from that of *Lyda* or *Sirex*, but in habits the larvæ approaches nearer to the latter. *Cephus* agrees with *Lyda* and differs from the *Siricidæ* in having spines on the tibiæ. The form of the ovipositor is intermediate between the saw-flies and *Xiphydria*. The form of the labium agrees best as a whole with the saw-flies; but inasmuch as some saw-flies, *e. g. Lophyroides*, *Camptobrium*, have the labium entire, and the palpi from one to three-jointed, not much reliance can be placed on this point. The undoubted points of resemblance between *Cephus* and the *Tenthredinidæ* are—

(1) In the body being soft in texture.

(2) In the middle lobe of the mesonotum not reaching to the scutellum, and not being separated from it by a transverse line.

It agrees with the *Siricidæ*, and differs from the saw-flies in—

(1) The anterior tibiæ having only one spur.

(2) In the greatly elongated prothorax.

Genus—Cephus.

Cephus, Latr., Hist. Nat. Crust. Ins., iii, 303 (1802).
Astatus, Pz. (nec Latr.), F. G., 83, pl. xii (1801); Klug, Mon. Sir. Germ., 47.
Trachelus, Jur., Hym., 70.
Banchus, Pz., F. G., 73, pl. xvii (1797).
Janus, Stephens, Ill., vii, 107 (1835).
Phyllæcus, Newman, Ent. Mag., v. 485 (1838).
Ephippematus, Costa, Fauna Nap. Cef. 10 (1860).

Wings with two radial and four cubital cellules; the first radial cellule small; transverse radial nervure usually received in the middle of the second cubital cellule; first cubital cellule usually longer than second, receiving one recurrent nervure; the third cellule is the shortest and also receives a recurrent nervure, but the latter is often interstitial with the second transverse cubital nervure. The transverse basal nervure is joined to cubital and received in the first cubital cellule; the transverse median is usually received quite close to the transverse basal. Lanceolate cellule wide, divided by a straight cross nervure. Posterior wings with two median cellules; radial cellule not extending to apex of wing.

Antennæ usually longer than the abdomen, stout, eighteen to twenty-eight-jointed; the first two joints are rounded at the apex, the first with a short pedicle at the base and longer than second, the rest transverse; third joint equal to, longer than, or more rarely shorter than fourth; they are inserted half way up the face and between the middle of the eyes. Head cubital, seldom dilated behind the eyes; sutures on vertex obsolete; front projecting between the antennæ. Clypeus truncated at apex, but is sometimes toothed at the lateral angles. Mandibles stout, broad, with three irregular teeth. Maxillary palpi six-, labial four-jointed. Prothorax long, narrowed towards the head, and with a distinct slope from the mesonotum; it is nearly as long as the mesothorax. Mesonotum with a broad and not very deep furrow running from the scutellum to the middle lobe which is shorter, being broader than long. Scutellum nearly as long as the mesonotum, rounded at both ends; cenchri obsolete. Legs of medium length; femora moderately stout, shorter than tibiæ, which are shorter than tarsi; metatarsus long, spurs short; claws long.

Abdomen compressed strongly at the sides; at the apex the upper part projects.

Cephus contains three more or less well-marked groups, but they do not offer sufficiently well-defined points of distinction to warrant their being raised to generic rank.

Sub-genus JANUS.

Antennæ slender, filiform, not thickened towards the apex, twenty-three to twenty-four-jointed, the third joint longer than fourth. Eyes oval, not reaching to the base of mandibles. Abdomen not more than one half longer than the thorax. The fourth joint of maxillary palpus double the length of sixth. The basal joint not half the length of second.

1. CEPHUS FEMORATUS.

Vol. II, Pl. VII, fig. 1, ♀; 1 *a*, Mandible; 1 *b*, Labium; 1 *c*, Maxillary Palpus. Vol. III, Pl. III, fig. 3, ♂. Vol. III, Pl. IV, fig. 9, Cocoon in willow twig.

Cephus femoratus, Curtis, B. E., vii, pl. ccci.
Janus connectus, Ste., Ill., vii, 108, pl. xxxvi, fig. 1.
Phyllœcus faunus, Newm., Ent. Mag., v. 485.
Cephus cynosbati, André, Species, i, 531, pl. xxiii, fig. 2, Cat. 67,* 3.

Black, shining; mandibles testaceous; four anterior tibiæ and tarsi testaceous, the tarsi somewhat more obscurely coloured; a line on the pronotum, base of femora and basal third of posterior tibiæ, white. Wings hyaline, nervures black.

The ♂ has the apical third of the anterior femora and the whole of the four posterior reddish, the tibiæ pale testaceous, and the base of posterior tibiæ white; the anus is testaceous; the anterior tarsi are slightly fuscous.

Length 5—7 lines.

An easily recognised species. The white band on the pronotum is sometimes absent.

The larva has been described by Giraud. It is of the usual form, and is found in the lower branches of

the oak, which become swollen at one end into a spindle-shaped enlargement; and this swelling either becomes dried and withered, or may remain green; exteriorly the part inhabited by the larva becomes covered with little knob-like elevations. The larva spins a thin, semi-transparent cocoon, and quits the branch by a hole in the basal part of the swelling. Giraud records *Ephialtes inanis*, Grav., as a parasite. It is not an uncommon species in the South of England in early summer in gardens. Billups has reared it from the stem of a willow, the branch not being in any way enlarged.

The *Tenthredo cynosbati*, Lin., is not this species, but a ♂ *Pimpla* of the *examinator*-group, probably *P. strigipleuris*, Thoms., cf. Möller, Entom. Tidskrift iv, p. 91, 1883.

Continental distribution: France, Holland, Germany, Italy.

Sub-genus PHYLLŒCUS.

Antennæ twenty-five to twenty-eight jointed, thick, subfiliform, thin at base, becoming gradually thicker towards the apex; the third joint a little longer than fourth. The basal two joints of maxillary palpus nearly equal, fourth but a very little longer than sixth. Prothorax not transverse. Hind tibiæ with one spine.

1 (2) Pronotum yellow, the sides of abdomen with six or seven broad yellow bands, the fourth segment banded with yellow. ♂ with two yellow marks on vertex, coxæ and femora yellow. *Linearis.*

2 (1) Pronotum entirely black, sides of abdomen with three small yellow marks, the fourth segment not yellow. ♂ vertex without yellow, coxæ and femora black. *Satyrus.*

2. Cephus linearis.

Vol. II, Pl. VII, fig. 2, ♂ ; 2 *a*, Mandible ; 2 *b*, Maxillary ; 2 *c*. Labium. Pl. III, fig. 30, ♀ .

Tenthredo linearis, Schrank, En., 343, 693.
Cephus quinquefasciatus, Ste., Ill., vii, 104.
Cephus faunus, Thoms. (nec Newm.), Hym. Sc., i, 319, 1.
Phyllœcus faunus, André, Species, i, 543; Cat. 68,* 9,
Cephus linearis, Kirby, List of Hymen., i, 357, 14; pl. xiv, fig. 7.

Black, base of antennæ, head and thorax covered with a close, short, blackish pubescence; a spot on each side of the eye, on the inner side close to the vertex, the face (except a small dot on centre of clypeus, the side of the clypeus and the edges of the labium which are black), the lower orbits of the eyes, the edges of the pronotum, tibiæ, tarsi and lower side of apex of femora, reddish-testaceous; the lower side of the second and fifth abdominal segments, and the others all round, yellow. Wings hyaline, with a yellowish tinge, costa, nervures and stigma testaceous; second recurrent nervure interstitial, transverse median received close to transverse basal. Mesonotum punctured. ♀.

The ♂ has the coxæ, trochanters and femora, black, except that the posterior coxæ has a large testaceous mark, and the yellow bands on the abdomen are broader; the anal segment is only very narrowly edged with black.

Length 5½—8 lines.

Rare. Bristol (Stephens), London district (Billups), Hastings (Andrews).

Continental distribution : Sweden, Hungary.

3. Cephus satyrus.

Astatus satyrus, Pz., F. G., 85, pl. xii.
Cephus satyrus, Lep., Mon., 21, 62; Ste., Ill., vii, 105, 3; André, Species, i, 547; Cat. 67,* 33.

Black; mandibles at base; knees, tibiæ and tarsi, reddish-testaceous; a spot on the side of the second, third, fifth and sixth abdominal segments close to the junction with the ventral division, whitish-yellow. Wings hyaline, costa and stigma testaceous; first recurrent nervure interstitial. Palpi black; face and mesonotum punctured.

The ♂ has the mandibles, the lower orbits of the eyes on inner side, and six small marks on face (two below, four above), reddish-testaceous; the third and fifth abdominal segments are yellow all round the sides and back; the third cubital cellule is shorter, being as a rule almost square, and the first recurrent nervure is not interstitial.

Length 5½—6½ lines.

This is a smaller species than *linearis* and is easily

known from it by the pronotum being entirely black, by the vertex being without any yellow marks, the marks on the abdomen being very much smaller, and the fourth segment is entirely black, while the second cubital cellule is shorter compared to the third. The ♂ is readily separated from that of *linearis* by the femora and coxæ being entirely black.

Sub-genus CEPHUS.

Antennæ eighteen to twenty-three-jointed, apex clavate or sub-clavate. The basal two joints of maxillary palpus subequal. Sixth scarcely double the length of fourth. Eyes reaching to near the base of the mandibles.

1 (2) Hind tibiæ with only one spine. Antennæ longish, third joint almost shorter than fourth. Posterior legs fuscous. Ovipositor short. Abdominal segments two to six, bordered with yellow. Antennæ usually 23-jointed. *Arundinis.*
2 (1) Hind tibiæ with two spines.
3 (4) Abdomen entirely black, antennæ 18—20-jointed, clavate. First recurrent nervure interstitial. *Phthisicus.*
4 (3) Abdomen marked or banded with yellow.
5 (6) A longish spot on each side of the abdominal segments, the whole forming an almost continuous band. *Tabidus.*
6 (5) Abdomen with two or more yellow belts.
7 (8) Apex of abdomen black, a yellow band only on the fourth and sixth segments. Head sub-cubical, vertex emarginated. Length 7—8 lines. *Niger.*
8 (7) Apex of abdomen yellow. Head transverse, vertex scarcely emarginated. Length 2½—4 lines.
9 (10) Abdomen with two yellow complete bands, antennæ brownish at apex. Breast and vertex pilose. Hind tibiæ and tarsi testaceous. *Pusillus.*
10 (9) Abdomen with more than two complete bands, posterior tibiæ and tarsi fuscous. Antennæ black. *Pygmæus.*

Males.

1 (2) Breast, coxæ and femora more or less yellow. *Pygmæus.*
2 (1) Breast black.
3 (4) Abdomen entirely black. *Phthisicus* var.
4 (3) Abdomen banded with yellow.
5 (6) With three complete bands (the fourth, fifth and sixth segments), antennæ 18—20-jointed. *Phthisicus.*
6 (9) With only two complete yellow bands.

7 (8) Length 7—8 lines. The fourth and sixth abdominal yellow. Head cubital, vertex emarginated. *Niger.*
8 (7) Length 2½—3 lines. The third and fifth segments banded. Head transverse, the vertex scarcely emarginated. *Pusillus.*
9 (6) Abdomen with a row of triangular yellow spots along the sides, none of the segments banded. *Tabidus.*

4. CEPHUS ARUNDINIS.

Vol. II, Pl. VII, fig. 3, ♀.

Cephus arundinis, Giraud, Verh. z.-b. Ges. Wien, xiii, 1286 (1863).
Cephus quadricinctus, Thoms., Hym. Sc., i, 320, 2.

Black, head and thorax opaque, finely punctured, pubescent; antennæ longish, slender; four anterior knees, tibiæ and tarsi, yellow; middle joints of palpi yellow; a more or less longish line on second, a band on third, fourth, and fifth, usually complete, a more or less incomplete one on sixth, and sometimes a small mark on seventh, yellowish-white. Saw short, not projecting beyond the cerci. Wings hyaline; costa testaceous, stigma fuscous or black; first recurrent nervure interstitial, ♀.

Black; mandibles, a brown spot on lower orbits of the eyes on the inner side, and a large bell-shaped mark on clypeus with a little black mark in its centre, the coxæ and trochanters on lower side, the anterior femora on the lower side, the middle pair entirely, except a ring at the base, the posterior on lower side, except at base and apex, and the four anterior tarsi, yellow; a small mark on lateral edge of second abdominal segment, a larger one on third, the fourth, fifth, and sixth, all round, the seventh at the side and the anal appendages, yellow. Wings hyaline, costa testaceous, stigma fuscous, ♂.

Length 5½ lines.

The one spine on the black posterior legs, the greater number of yellow bands on the abdomen, the cubical head, emarginated behind, and the closely punctured head and thorax, easily separate this species from the others in this section. The greater extent of yellow on the face of ♂ and the yellow front legs make it easy of identification.

The larva lives in the stem (the smaller-sized ones) of the common reed (*Arundo phragmites*), the stem being neither enlarged nor distorted by the larva, which makes its escape by the side at the top of the place where its transformation has taken place (cf. Giraud, l. c. supra).

Apparently not uncommon. London district, Worcester (Fletcher).

Continental distribution: Sweden, Germany.

5. CEPHUS PHTHISICUS.

Pl. III, fig. 7, ♀; fig. 8, ♂.

Cephus phthisicus, Fab., S. P., 251, 5; Lep., Mon., 21, 61.
— *pallipes*, Htg., Blattw., 302, 9; Thoms., Hymen. Sc., i, 320, 3; Evers., Bull. Mosc., xx, 64, 6; André, Species, i, 527, Cat. 65,* 10.
— *cultrarius*, Htg., l. c. 363, 9; Evers., l. c., 64, 5.
— *immaculatus*, Ste., Ill., vii, 107.
— *phthisicus*, Kirby, Hym., i, 360, pl. xiv, fig. 3.

Black; mandibles, knees, tibiæ and tarsi, testaceous, apex of hind tibiæ and the greater part of the hind tarsi black. Wings subhyaline, recurrent nervure interstitial; transverse median nervure almost interstitial. The head and mesonotum are sub-opaque, finely punctured.

The ♂ has a broad yellow band on the fourth, fifth, and sixth abdominal segments, and the anal segment is also more or less yellow; the antennæ are usually brownish at the apex and the anal segment.

Length 4—5 lines.

Not common. London districts, Hertford, Bristol (Stephens).

Continental distribution: Sweden, Germany, France, Italy.

6. CEPHUS TABIDUS.

Pl. III, fig. 9.

Sirex tabidus, Fab., S. E., 326, 8.
Astatus tabidus, Klug, Mon. Sir., 59, pl. vii, fig. 3, *a*, *b*.
Cephus tabidus, Fab., S. P., 252, 6; Lep., Mon., 20, 57; Ste., Ill., vii, 106, 9; Htg., Blattw., 363; Taschenberg, Zeits. Ges. Natur., xxxviii, 306; Costa, F. N., Cef. 8; André, Species, i, 535, Cat. 66,* 26.*
— *mandibularis*, Lep., Mon., 19, 54.
Tenthredo longicollis, Fourc., E. P., ii, 578, 45.

Black; mandibles, fore knees and tibiæ and tarsi in front, yellow; a longish spot on the side of each abdominal segment (the whole forming an almost continuous band) luteous; wings hyaline, costa fuscous.

Length 4½ lines.

A species easily known by the almost continuous yellow band on the abdomen.

Seemingly not common. South of England, Hertford, Cambridge, Whittlesea Mere, Dover, Southgate (Stephens).

Continental distribution: Sweden, Germany, Spain, Italy, North Africa, Syria.

7. Cephus niger.

Syrex niger, Harris, Exp. Ins., p. 94, pl. xxviii, fig. 2 (1776).
— *troglodyta*, Fab., Mant., i, 258, 17 (1787).
Astatus troglodytus, Pz., F. G., 83, pl. xii; Klug, Mon. Sir., 49, pl. vi., fs. 1, 2, *a*, *b*.
Cephus troglodytus, Htg., Blattw., 360, 1; Lep., Mon., 20, 59; Ste., Ill., vii, 104, i; Costa, F. N., Cef. 3; Thoms., Hym. Sc., i, 321, 4; André, Species, i, 548; Cat. 67,* 34.

Black; mandibles, the fourth and sixth abdominal segments all round, and a triangular mark on the side of the third and seventh, yellow; knees, tibiæ, and tarsi testaceous; apex of posterior tibiæ and the greater part of the hind tarsi fuscous. Wings hyaline, stigma testaceous.
Length 7—8 lines.

This is a larger species than *pygmæus*, the antennæ are shorter and less thickened towards the apex; the yellow bands on the abdomen are narrower, and there is no yellow on the last segment; the stigma and nervures, too, are testaceous, not black as in the common species; the ♂ is readily known by the black breast, and the legs do not differ in coloration from those of the ♀.

Not common. London district. Hertford (Stephens).

Continental distribution: Sweden, France, Germany, Hungary, Switzerland, Italy.

8. CEPHUS PYGMÆUS.

Pl. III, fig. 4, ♀; fig. 5, ♂. Pl. IV, fig. 8, Lar. (after Curtis).

Sirex pygmæus, Lin., S. N., i, 929, 7.
Astatus pygmæus, Klug, Mon. Sir., 50, pl. vi, fig. 3.
— *spinipes*, Klug, l. c., 61, pl. vi, fig. 4, *a*, *b*.
Banchus viridator, Fab., S. P., 127, 5.
— *spinipes*, Pz., F. G., 73, pl. xvii.
Tenthredo longicornis, Fourc., E. P., ii, 378, 44.
Cephus leskii, Lep., Mon., 20, 58.
— *pygmæus*, Ste., Ill., vii, 105, 6; Htg., Blattw., 361; Costa, F. N., Cef. 4; Thoms., Hym. Sc., i, 322.
— *atripes*, Ste., Ill., vii, 105, 4.

Black, shining; antennæ distinctly thickened towards the apex; a large mark on side of third, a broad band all around the fourth and sixth, more or less of the seventh, and the apical segment, citron-yellow; knees, base of posterior tibiæ, and the anterior four tibiæ and tarsi, testaceous. Wings hyaline, nervures black.

The ♂ has the greater part of the clypeus, the lower orbits of the eyes on the inner side, the breast, coxæ, trochanters, and the lower side of the femora, yellow.

Length 3½—4 lines.

Ab.—*a*. Hind tibiæ for the greater part testaceous.

The larva feeds in corn stems. The egg is inserted a little below the first joint. The larva as soon as hatched commences to eat its way upwards, boring through, it may be, all the joints; when it becomes full-fed it makes its way down again to the bottom of the stem close to the roots; bores a hole there for exit as a fly; then spins a cocoon, in which it remains unchanged till the following spring, becoming a pupa and emerging in the perfect state in the early summer in time to deposit its eggs in the young growing corn.

In consequence of so much of the inside of the stem being devoured by the larva the plant is insufficiently nourished, becomes weak and discoloured, bears few if any perfect grains and but a small number of ears, which are empty and erect and pale in colour, and finally in the autumn are felled to the ground by the wind.

In this country it has never been reported as a very injurious insect. When the larvæ do appear in great numbers in a field the most effectual plan to eradicate them is to root up and destroy by burning or otherwise the roots of stubble in which the larvæ are pupating. On the Continent the species has been known to do very great injury.

Pachymerus calatrator, Gr., is the parasite.

The flies appear in June, frequently being found on umbelliferous plants.

Common in the South, rare or absent in the North.

Continental distribution: Sweden, Germany, Holland, Switzerland, France, Spain, Italy, Russia, Syria.

9. CEPHUS PUSILLUS.

Pl. III, fig. 6, ♀.

Cephus pusillus, Ste., Ill., vii, 107, 11; Kirby, List of Hym., i, 358, pl. xiv, fig. 6.

Black; mandibles, palpi, apex of anterior four femora, tibiæ and tarsi, yellowish-testaceous; apex of hind tibiæ and the apices of tarsal joints fuscous; the fourth and sixth segments broadly at the sides, the apical segment, and the basal half of sheath on lower side, yellow. Antennæ distinctly clavate, brownish at the apex. Wings hyaline, costa and stigma testaceous, nervures fuscous.

The ♂ has the yellow abdominal bands broader, and there is a broad yellow stripe on the side of the seventh; the antennæ are more brownish at the apex.

Length 2½—3 lines.

This species differs from *pygmæus* in being smaller, the antennæ are longer and brownish towards the apex, there are only two yellow bands on the abdomen in the ♀, and the posterior tibiæ and tarsi are yellowish-testaceous; the costa and stigma are lighter in colour, the transverse radial nervure is received nearer the apex of the second cellule, which is shorter compared to the third. The ♂ is readily known from that of *pygmæus* by the breast and pleuræ being quite black. The ♂ resembles the ♂ of *pallipes*, but its abdomen is shorter and broader, and has not so many nor such

broad yellow bands, and the second cellule is distinctly longer compared to the third.

Rare. St. Albans (Marshall). London district and Bristol (Stephens).

Family SIRICIDÆ.

The species belonging to this family have globular heads, often dilated behind, many jointed, setaceous or filiform antennæ inserted between the eyes, and not far from the clypeus; strong, three-toothed mandibles, weak lower mouth organs with few joints in their palpi; a well-developed prothorax, mesothorax large, with a transverse line in front of the scutellum; a cylindrical abdomen in the females at least, and a strong, horny projecting ovipositor, which has the boring part soldered closely; the anterior tibiæ have only one spur, the transverse basal nervure is always received in the first cubital cellule; the body is hard and leathery in texture, and lastly, the larvæ are wood borers and have no ventral legs, but a spine on the apex of the abdomen.

The points of distinction between the *Siricidæ* and *Tenthredinidæ* are not very numerous; in fact they are limited to three. Some *Tenthredinidæ* have multi-articulate antennæ, others, *e. g. Lophyroides*, *Decameria* have the labium entire, and have palpi and maxillæ not unlike those of *Sirex*, the palpi, too, having few joints; in *Pamphilius*, &c., the transverse basal nervure is received in the cubital cellule; that genus, also, has larvæ not unlike those of *Sirex*; if *Cephus* is not to be regarded as a Siricid the one spined anterior tibiæ is not peculiar to them, *Cephus* having an elongated ovipositor. The really distinctive characters then of the *Siricidæ* are:

(1) A hard, strong outer skin.

(2) A transverse line at the base of scutellum, and

the middle lobe of mesonotum being continuous with the scutellum.

(3) In the two supports of the ovipositor being firmly soldered together, forming an almost closed tube.

The differences between the ovipositors of *Tenthredo* and *Sirex* are two; they are not broad and toothed; the two pieces I have called in the *Tenthredinidæ* the supports, and which with these are separate, have here become soldered together forming a hollow channel (but not a complete tube), inside of which the stilets (= the cutting saw of Tenthredo) lie, almost completely filling the cavity of the "borer." A reference to the figure on Pl. VII, fig. 6, Vol. II, and a comparance of it with the ovipositor of *Cephus* or with *Trichiosoma* on Pl. X, fig. 5, Vol. I, will show that in general structure these are quite identical. The "triangular plate," by means of which the instrument is attached to the last abdominal segment, is small, hollow on the inner side, and has a stout outer border for the attachment of the muscles. The sheath is long and narrow, and becomes still narrower as the apex is reached. Like the triangular plate it is hollow internally, so that when the two pieces are brought together they form a tube, completely enclosing the borer and the spicules. At its junction with the triangular plate it has on the inner side a strong wire-like process, and a similar one runs at right angles from it to the opposite side, where the borer is attached to it. The lateral plate (= oblong plate of *Tenthredo*) ends where the ovipositor leaves the abdomen, and here there is a strong ligature binding the whole. As stated above the two separate supports of the ovipositor have amalgamated, and form a long, narrow, thin tube, marked with oblique bars at the apex. The spicules have the same form and have likewise projecting points at the apex. They fill the borer completely, and as the latter is quite rigid and has no flexibility except from the abdomen, it is obvious that the spicules can only have an up-and-down movement. The attachment of these pieces to the sheath is as in

Tenthredo; the borer attached to the lateral plate at the top, and the spicules to the triangular plate.

In the sub-imago state the lateral sheath is, as in the imago, pressed close to the side of the abdomen, the sheath being free; the lateral plate on the outer side is grooved; the sheath is not; and its apex is bent so as to form a sort of hook. As in the imago the "borer" has its two pieces united, the upper part being grooved. It lies between the lateral plate and the sheath, and has the two spicules immediately over it. These are grooved throughout, and at the top one side goes more in the direction of the lateral plate than the other. At this stage they are shorter than the borer, which extends to the apex of the sheath.

The apex of the sub-imago is a blunt stumpy point, turned over on itself above.

The family contains two sections :—

The *Siricina* with the pronotum transverse and perpendicular in front, the palpi with 1 or 2 joints in the maxillary, and 3 in the labial; no sutures on the mesonotum, and the abdomen terminating in a spine; and the

Xiphydrina with the pronotum emarginated in front and not perpendicular, the prosternum greatly elongated, the maxillary palpi have 5, and the labial 3 joints, and the abdomen does not end in a spine.

Genus—XIPHYDRIA.

Xiphydria, Latr., Hist. Nat. Crust. Ins., iii, 304 (1802); Htg., Blattw., 367.
Hybonotus, Klug, Mon. Sir. Germ., 11.
Xiphiura, Fallén, N. Hym. Disp., 1813.
Xiphidion, Provancher, Nat. Canad., x, 233.

Antennæ 14—22-jointed, filiform. Wings with two radial and four cubital cellules, the first cubital receiving the transverse basal nervure, the second and third the recurrent nervures. Lanceolate cellule with an oblique cross nervure. Posterior wings with two middle cellules. Maxillary palpi 5-, labial 3-jointed, the labium entire. Posterior tibiæ with two spurs. Prosternum greatly elongated, incised in front. Sutures on mesonotum distinct.

The head is cubical, bordered behind, vertex and front without sutures. Eyes oval, placed well in

front, the head projecting broadly behind them. Ocelli in a triangle, situated on a level with the top of the eyes. Antennæ arising not far from the base of clypeus and a little above the lower part of the eyes; eighteen to twenty-two-jointed, second joint large, curved, third joint shorter than second, fourth nearly double its length, the next shorter and thinner. Clypeus transverse, labrum rounded, small. Mandibles stout, with three blunt, short, subapical teeth. Basal joint of maxillary palpi small, second as long as the three following together. These are of nearly equal length; the middle joint of labial is much shorter than either of the others, the third a little shorter than first, and much thicker than it.

The prosternum is greatly elongated and incised, narrowed at the insertion of the head, and as it does not occupy the hollow between the pronotum and mesosternum, it has great powers of movability. Above it is membranous and white, the chitinous part contracting more or less beyond the middle. It is situated low compared to the pronotum, and can be retracted into it to some extent. The collar is emarginate at the apex. The sutures in the mesonotum are deep, but not very wide. Cenchri large. Basal segments of abdomen large, cleft in the middle above. The sides of abdomen with an acute border. The claws have a middle tooth.

The cubital nervure is almost interstitial with the cross nervure in the costal cellule; the transverse basal nearly with the transverse median and at the very end of the median cellule; the second recurrent is often interstitial.

There are only three European species of *Xiphydria*, ten have been described from North America, one from India, and two from the Malay Archipelago. There is a South American genus *Derecyrta*, Smith, which appears to be recognised from *Xiphydria* by having only one radial cellule and the ovipositor shorter; another has been described from Chili, which is separ-

able from it only by the last peculiarity. *Xiphydria*, it may be added, has often only one radial cellule, and Hartig gives one as the normal number.

The larva of *Xiphydria* was described (Trans. Ent. Soc., ser. i, vol. iv, 123) by Westwood. It is cylindrical, soft, white, and fleshy. The head is small, and when at rest is obscured by the first three body segments, which are larger than the others. It is also of a harder consistency than the rest of the body, and is placed much lower down than usual. The upper lip is small and rounded in front; the mandibles are strong, short, and have three or four teeth; the maxillæ are composed of two parts, an inner part fleshy and rather hairy at the interior margin, and an outer which is not longer than the inner, but has the rudiments of several joints. The labium has no appendages, and the under jaws and lip are united at their base and have a common motion. The rudimentary antennæ are placed a little above the base of the mandibles, are very short, and formed of several small rings, which become gradually smaller towards the apex. The first three body segments are much broader and larger than the head or any of the other segments, are much wrinkled on their upper side when the insect is at rest, but when in motion the wrinkles become inflated and form a smooth surface. The thorax has three pairs of very minute fleshy legs, which appear to be never used. The other segments have no legs, but have a pair of lateral raised fleshy tubercles of the length of the joint, the whole looking like a row of white coral beads along the side. The last segment is larger than any of the immediately preceding, is flattened above, has several impressed lines on its surface, and is rounded beneath. At its apex is a short spine, composed of several pieces of various lengths soldered together, and arising from the centre of a coronet of very minute spines.

X. dromedarius feeds on willows; *X. annulatus* on *Acer campestris* (cf. Giraud, Verh. z.-b. Ges. Wien, iv, p. 603); and *X. camelus* is stated by Frauenfeld

(Verh. z.-b. Ges. Wien, 1868, p. 885) to have destroyed a birch of about an inch and a half in thickness.

Synopsis of Species.

1 (2) Abdomen black with white marks along the sides; transverse median nervure interstitial. *Camelus.*

2 (1) Abdomen red in the middle; transverse median nervure not interstitial. ♂ with a tuft of stiff hair on the fifth and sixth abdominal segments. *Dromedarius.*

1. Xiphydria dromedarius.

Vol. II, Pl. VII, fig. 4, ♀ ; 4 *a*, Ovipositor; 4 *b*, Labium; 4 *c*, Maxilla; 4 *d*, Head from front; 4 *e*, Mandible. Vol. III, Pl. IV, figs. 10 and 11 (after Westwood).

Sirex dromedarius, Fab., Mant. Ins., ii, 258, 14.
Xiphidria camelus, Fab., S. P., 52.
Hybonotus dromedarius, Klug, Mon., 15, pl. i, figs. 6, 7.
Xiphydria fasciata, Lep., Mon., 3, 4.
— *dromedarius*, Ste., Ill., vii, 110; Htg., Blattw., 370; Thoms., Hym. Sc., i, 331; André, Species, i, 561; Cat., 70,* 2.

Black; the third to sixth segments of abdomen and legs red, the lower orbits of the eyes, two broad longish stripes on vertex, and a smaller and rounder one at the side behind, a longish spot in front of tegulæ, a mark on side of each abdominal segment from the third to seventh, that on the latter being much the largest, white; coxæ and trochanters for the most part black; base of tibiæ white; base of tarsi whitish, the apex infuscated. Wings hyaline, nervures black.

The ♂ has the four middle segments of abdomen red, the tibiæ red, fuscous in the middle; the ventral surface is hairy, and on the fifth and sixth segments is a tuft of hairs in the middle.

Length ♀ 6—9 lines, ♂ 4—6 lines.

The late Mr. F. Smith told me that this species is plentiful about old willows in the London district. Fulham, Norfolk, New Forest (Stephens).

Continental distribution: Sweden, Germany, Holland, Russia, France, Switzerland.

2. XIPHYDRIA CAMELUS.

Ichneumon camelus, Lin., S. N., i, 560, 4 (1758).
Sirex camelus, Lin., F. Sv., 397.
Hybonotus camelus, Klug, Mon., 14, pl. i, fs. 4, 5.
Xiphydria camelus, Ste., Ill., vii; Htg., Blattw., 369; Thoms., Hym. Sc., i, 330; André, Species, i, 562, pl. xxiv, f. 3; Cat., 70.*

Black; legs red; two longish marks on vertex and two smaller and more rounded ones behind, a spot in front of tegulæ, and five or six large irregular marks on sides of abdomen, white. Coxæ, trochanters, and the apex of tarsi, black. Generally the lower orbits of the eyes are white, but they may be black entirely. Wings hyaline.

The only ♂ I have (a very small one) wants the white spots on the head, but otherwise, *mutatis mutandis*, agrees with the ♀.

Length 7—10 lines.

Newcastle, South of Scotland (Stephens).

Continental distribution: Sweden, Germany, Russia, Holland, France, Switzerland, Tyrol, Italy.

Genus—SIREX.

Sirex, Lin., Faun. Sv., p. 396 (1761); Klug, Mon., 31.
Urocerus, Geof., Ins. Par., ii, p. 264 (1762).

Antennæ 18—25-jointed, setaceous or filiform. Head much dilated behind. Wings with two radial and four cubital cellules. Lanceolate cellule with an oblique cross-nervure. Posterior wings with two middle cellules. Abdomen ending at apex in a serrated spike-like projection. Labial palpi 3-, maxillary 1-jointed. Pronotum transverse in front, with an almost perpendicular slope; prosternum small. Sutures on mesonotum obsolete.

The head is well developed behind the eyes, which have between them the ocelli. The clypeus is transverse, and is immoveably united (there being no suture) with the front. Mandibles stout, thick, bluntly toothed. Labium and maxilla small, the former much the larger of the two, and placed in front of the latter. Its apex is membranous, rounded, entire, the apical membranous part narrower than basal; both are covered with long bristle-like hairs. The apical joint longer than the other two together, and also thicker. At the base the

labium is broadly incised. The maxillæ are united at the base. The maxilla proper is composed of one long narrow lobe, rounded at the apex and covered with long hairs. At the base laterally is a short thick palpus. From where this issues from the maxilla there is a short projection, but whether it represents a joint or only a slight dilatation of the maxilla I cannot say, but in some species it has every appearance of being a joint. The cardos are united by a stout membrane of the same colour and consistency as themselves; they are rounder, contracted at base, and bear on the apex some long hairs.

The radial and cubital nervures seldom reach to the apex of the wings, so that thus the second radial and four cubital and outer discoidal cellules are continuous. The first radial cellule is much shorter than second. Of the cubital cellules the first is minute, the second as long as the third and fourth together. Often the transverse basal nervure is joined to the first transverse cubital. Stigma longish, linear. There are two middle cellules in posterior wings.

The abdomen has eight segments. On the back all are fully developed; the basal is longer than any of the five following, which are of nearly equal length; the seventh is larger; the eighth is still larger, and terminates in a long hollow spine, the sides of which bear irregular, short, tubercle-like teeth. On the ventral surface the basal segment is fully as large as its upper portion, and it does not project so far to the base, but is pushed more to the apex; the second, third, and fourth are smaller than the upper divisions; the fifth is smaller and much contracted in the middle; the sixth projects in the middle, so that it is more than double the length of the fifth, but it is contracted at the sides. At the apex the lower and upper divisions (the hypopygium and epipygium) are united. Beneath in the middle there is a long slit in which the ovipositor lies. Above (except at the apex) it is open, this part being covered by the sixth and seventh seg-

ments. On the ventral side it occupies fully half of the total surface. The seventh segment has no ventral continuation. The anus has its exit in the apical spine.

The larva is fleshy, cylindrical, colourless, with fourteen segments, and provided with short stumpy legs, in which the usual divisions are almost obliterated. The head is smooth, shining, eyeless; on each side above the clypeus are short, nipple-like, thick, apparently biarticulate antennæ. Clypeus slightly projecting, narrower towards the apex, which is transverse; labrum of the same form as the clypeus, but smaller. Mandibles broad, quadrate, and unlike each other, the right having a large lobe on the inner and four short teeth on outer side; in the left the basal (or inner) part has no teeth as in the right, but it does not project; at the apex are four blunt teeth. The left is hollowed throughout at the apical half, the right only obliquely at the inner side behind the toothless part. The right lies against the left, which projects in front of it when at rest.

Lower mouth organs small, thick, and fleshy. The maxillæ have on the outside short, stumpy, two-jointed palpi, originating from a projecting basal lobe; the outer lobe is broad at the base, and terminates in a projection not unlike a palpus. This is regarded by Westwood (Int., ii, p. 116) as the real palpus, but I think it will be admitted, by comparing it with the maxilla of a *Tenthredo* larva, that it is really the outer lobe; what I consider to be the palpus, Westwood states is "very minute and exarticulate;" which is not the case, it being more than half the size of the outer lobe, and is most clearly biarticulate in all the specimens I have examined. The inner lobe is thinner and sharper than the outer, but is thicker at the base; the top is rounder, and the biting edge is provided with some brownish setæ. The labium is fleshy, thick, produced above considerably, and bearing short, stumpy, two- (or perhaps three-) jointed palpi.

The abdomen has no prolegs, but below the spiracles the segments are developed into fleshy protuberances, which project over the belly. There is no great difference, if any, in the size of the segments, until the fourteenth is reached. This is much larger than the others; at the apex it is acute, and terminates in a sharp, horny spine. At the base of this above is a projecting ridge or tooth; at the middle there is a similar tooth, there being a gradual reduction in the thickness of the spine with each tooth. In the centre of the segment above is a deep depression, and on either side of this, at the apex, is a short, blunt, horny tubercle. This part of the segment is separated from the spine-bearing portion by a depression. It bears some minute, brownish setæ, and there is a row of short tubercle-like setæ in front of the terminal spine.

The larvæ are found in various species of firs, feeding internally in the wood, in which they bore galleries; and often, when they are numerous in a tree, they completely riddle it. There seems to be a consensus of opinion that the ♀ only lays her eggs in living trees which are already diseased, ovipositing in those places which show signs of decay. They will also lay eggs in fallen trees. As an example of the way in which they may infest a tree, it is stated by Mr. Raddon (Trans. Ent. Soc., i, p. 85, Append.) that twenty feet of a fir tree from Worcester were so intersected by the burrows made by the larvæ that it was only fit for firewood. From it the imagos came out every morning, five or six coming out every day. The females at first only averaged one in twelve; afterwards they became more numerous, and continued to come out to the end of November, by which time only females were produced.

In this country the species seldom occur in sufficient numbers to cause serious injury to the fir plantations, but it is different in the large pine forests of Germany and Northern Europe, where their ravages have been serious.

The female lays 100 eggs according to Hartig. The duration of the larval life appears to vary. They may become full-fed in seven or eight weeks, but others appear to take a much longer period; and the period in which they may remain in the larval stage, even after they are apparently full-fed, is uncertain. The perfect insects make a humming noise when flying.

It is difficult to say how many species may be really indigenous in Britain, possibly not more than two, *gigas* and *juvencus;* and even with these (and especially the former) very few of the specimens taken alive are of native origin, the vast majority having been introduced with foreign timber. They often are found near wood-yards, railway stations, and in coal-pits. As nearly all the European species have been found in Britain, I give a synopsis of them. In addition to these, *Sirex cyaneus*, Fab., = *nigricornis*, Newman, = *duplex*, Shuckard; *S. albicornis*, Fab., *S. flavicornis*, F. (of which *S. bizonatus*, Ste., is a var.), and *S. Stephensii*, Kirby, = *magnus*, Ste., all natives of America, have been found occasionally.

Synopsis of European Species.

1 (4) Antennæ short, thick, somewhat fusiform; twelve- to sixteen-jointed; posterior tibiæ and base of tarsi flattened. Wings with three cubital cellules. = *Tremex*, Jur.

2 (3) Dull black; abdomen yellowish, more or less black; wings yellowish. Antennæ fuscous, testaceous at base. *Fuscicornis*, F.

3 (2) Blue; abdomen with white spots; apex of antennæ white; wings smoky. *Magnus*, F.

4 (1) Antennæ longish, filiform or setaceous, with more than eighteen joints. Wings with four cubital cellules. = *Sirex*.

5 (10) Body for the greater part blue.

6 (7) Posterior tibiæ with one spur. Ovipositor nearly as long as the body, or at least as long as the abdomen; sides of pronotum testaceous; the vertex marked with white. *Spectrum*, Fab.

7 (6) Posterior tibiæ with two spurs. Ovipositor not much longer than, if so long as, half the length of abdomen; sides of prothorax not testaceous. No white marks on vertex.

8 (9) Patellæ on joints 2—4 of hind tarsi distinct. Antennæ pale at the base. *Juvencus*.

9 (8) Patellæ indistinct. Antennæ black. *Melanocerus.*
10 (5) Body black; abdomen more or less yellow.
11 (12) Posterior tibiæ with the apical half black. *Augur*, F.
12 (11) Posterior tibiæ without black.
13 (14) The second to fifth abdominal segments black; meso- and meta-thorax entirely black; sides of pronotum very rarely marked with yellow; femora for the greater part black. *Gigas.*
14 (13) Fourth to sixth abdominal segments narrowly banded with black; pronotum and metathorax yellow; femora scarcely marked with black. *Fantoma.*

Males.

1 (2) Hind tibiæ with one spur. Sides of pronotum testaceous. *Spectrum.*
2 (1) Hind tibiæ with two spurs. Pronotum without testaceous.
3 (6) Head and thorax black.
4 (5) Head entirely testaceous behind the eyes. (Sometimes the entire body is yellowish.) *Augur.*
5 (4) Head not entirely testaceous behind the eyes. *Gigas.*
6 (3) Head and thorax blue.
7 (8) Eighth abdominal segment reddish in centre above. *Juvencus.*
8 (7) Eighth abdominal segment blue. *Melanocerus.*

1. SIREX GIGAS.

Vol. II, Pl. VII, fig. 6, ♀; 6 *a*, Ovipositor; 6 *b*, Top of Sheath; 6 *c*, Apex of Borer; 6 *d* and *e*, Last Abdominal Segment; 6 *f*, Trophi. Vol. III, Pl. IV, figs. 12—12 *a*—*h*, Lar.

Ichneumon gigas, Lin., S. N., i, 560, 1.
Sirex gigas, Lin., F. Sv., 396; Klug, Mon., 31, pl. ii, fs. 1—5; Ste., Ill., vii, 115; Htg., Blattw., 382; Thoms., Hym. Sc., i, 328, 5; André, Species, i.
— *marisca*, Lin., F. Sv., 397.
— *mariscus*, Lin., S. N., i, pt. ii, 929, 6.
— *psyllius*, Fab., E. S., ii, 124, 2.
— *hungaricus*, Christ, Hym., 414, pl. xlvii, f. 1.

Black; the head behind the eyes broadly, base and the three apical segments of abdomen, antennæ, knees, tibiæ and tarsi, yellow; wings yellowish, darker at base. Stigma testaceous.

The ♂ has the base and apex black, the rest yellow; posterior tibiæ and tarsi black, white at the base. The apical tarsal joints testaceous.

Length 12—16 lines.

Ab.—*a*. Pronotum broadly yellow.
b. Ninth segment black at base.

Rarer than *S. gigas*.
Continental distribution: General.

2. SIREX JUVENCUS.

Ichneumon juvencus, Lin., S. N., i, 560, 3.
Sirex juvencus, Lin., F. Sv., 396; Thoms., Hym. Sc., i, 327
— *juvencus*, var. 2, Klug, Mon., 38, pl. iv, f. 3; Htg., Blattw., 327.

Violet-bluish-black; legs testaceous, except coxæ and trochanters. Wings yellowish-hyaline. The antennæ pale or testaceous at the base.
The ♂ has the abdomen yellow, except at base; the legs testaceous, except the coxæ, trochanters and posterior tibiæ and tarsi.
Length 10—17 lines.

Rare.
Continental distribution: General.

3. SIREX MELANOCERUS.

Sirex noctilio, Fab., E. S., ii, 130, 22?
— *juvencus* (excl. var. 2), Klug, Mon., 36, pl. iii, f. 5; pl. iv, fs. 1, 2, 81; Htg., Blattw., 384.
— *melanocerus*, Thoms., Hym. Sc., i, 328.

Similar to *juvencus*, but the body has a more distinctly violaceous tint; the antennæ are black, without any trace of blue or violet, or testaceous at the base. The central suture on vertex is deeper, that in breast narrower, the abdominal spine is longer and narrower; the terebra projects more than its length beyond the apex of spine, while in *juvencus* it does not do so; the patellæ are more distinct; the wings want, as a rule, a yellowish tinge, and the costa and stigma (especially the latter) are darker.

The ♂ has the apex of abdomen bluish.

On all these points, however, I find so many intermediate variations that I can hardly look upon *juvencus* and *melanocerus* as really distinct.

Family ORYSSIDÆ.

This family is to be known from the other *Hymenoptera* with sessile abdomen by the fourth body-segment not being fissured, by the antennæ being placed below the level of the eyes and immediately over the mandibles, by the anterior tarsi having only three joints and the wings only two cubital cellules.

The eyes converge above; on their outer side is a sharp keel, which commences not far from their top and reaches near to their bottom; on the vertex are a number of tubercles on either side around the top of the ocelli. The front and clypeus form one piece, without any trace of segmentation; the latter is rounder at the apex, and from its edges runs a keel round the outer side of the mouth and mandibles. The basal joint of the antennæ is oval, thick, double the length of second; third as long as the fourth and fifth together, but thinner than them; sixth as long as the third, seventh a little longer than eighth, ninth a little longer than third, oblique at the apex, and followed by a short joint, which has a little pedicle at its apex. In the ♂ there are eleven joints, the apical being conical, and the others are not so irregular as in the ♀.

The mandibles are broad, thick, without teeth. The maxillæ at the top rounder and of one piece, leathery on the outer side, thin, membranous internally; their palpi are five-jointed; their basal joint is one-half longer than the second, which is much shorter than any of the others; third a little shorter than fourth, which is the longest; fifth a little longer than the two basal together, and shorter than third. Labium entire, and with three-jointed palpi; their joints are thick, the middle joint much the shortest.

Thorax stout; prosternum with a short neck, bordered above in front of pronotum; mesonotum without sutures; there is a transverse line in front of scutellum; scutellum somewhat flat, narrowed to a point behind (triangular). Cenchri of normal size,

touching mesonotum. Fourth segment large, without a blotch; first extending well down the sides.

The radial nervure springs from the middle of the stigma, and does not reach the end of the wing. The second cubital cellule is shorter than third, and receives one recurrent nervure; of which there is only one. The second cubital cellule receives also the basal nervure, which is joined to the transverse median. Of the discoidal cellules only the third is present. Lanceolate cellule petiolate. Hind wings with no middle cellules.

First abdominal segment as long as the fourth body-segment, and, like it, closely punctured; second segment a little, and the succeeding somewhat shorter than that.

Beneath the first segment is as large as it is above; the second small, not half the size of the third; that and fifth subequal; fourth a little longer; the sixth raised in the centre into a keel, which is sharp at the apex and projects into the segment itself. Probably this has something to do with the ovipositor.

I am only able to make out seven abdominal segments above in the ♀. In the ♂ there are eight beneath, but only seven above; the last ventral is as long as the seventh, and broader and rounder at the apex. In the ♀ it is largely developed. On the inner side of both pieces (for it is divided as usual in two) there is a well-developed keel; out from this it is hollowed, there being also a blunt keel on the opposite side of this. The apex is deeply and widely incised; on the inner side of the hypopygium, and at the end of the keel, is a small, somewhat triangular piece, which represents, I believe, the missing eighth segment. It is between these two pieces that the ovipositor is exserted.

The sheath of the ovipositor is horny, rather narrow, hollow, the two pieces forming a closed tube; the lateral plate is broader; a little above the sheath it curves round, and becomes dilated towards the

triangular plate; hollowed in the centre above, the internal keel formed by this hollow, having the muscles attached to it. The two other pieces of the ovipositor are formed as in *Sirex*, only they are finer and much longer, being nearly double as long as the abdomen. In repose they are not exserted. I am not quite certain how they are kept in position in the abdomen when retracted, not having a ♀ to dissect; but in one specimen the apex was apparently firmly inserted into the basal abdominal segment.

The ♂ has all the tarsi five-jointed, but the ♀ has only three joints in the anterior; the front tibiæ have only one spur. Claws simple. The four posterior tibiæ bear blunt irregular tubercles on the outer side.

Genus—Oryssus.

Oryssus, Latr., Précis, p. 111; Klug, Mon., 3; Westw., Int., ii, 121.

1. Oryssus Abietinus.

Sphex abietina, Scop., Ent. Carn., 296 (1763).
— *vespertilio*, Fab., E. S., ii, 129, 19 (1793); Klug, Mon., 7, pl. i, fs. 1—3.
Oryssus vespertilio, Htg., Blattw., 366.
— *coronatus*, Fab., E. S. Suppl., 218; Curt., B. E., x, pl. cccix; Thoms., Hym. Sc., i, 333.
— *albopunctatus*, Gimm., Bull. Mosc., ix, 434.

Black; the lower orbits of the eyes above the clypeus, the greater part of the third, fourth, and fifth antennal joints beneath, the knees, and the greater part of the outer side of tibiæ, white. Tarsi reddish; the abdomen bright red from the second segment.

Wings hyaline, the apex smoky, except the extreme tip and a broad stripe at the end of the stigma, extending to the cubital nervure from the stigma. Head and thorax and basal segment of abdomen coarsely punctured.

The ♂ has a broad yellow mark on the apical segment above.

Length 5—6 lines.

Rare. Darenth Wood, Devonshire (Stephens).

Family CYNIPIDÆ.

The name "*Cynips*," as a generic term, originated with Linnæus.

Under it he ranged diversely related species, part only really belonging to the *Cynipidæ*, the others being parasites or gall-flies not connected with the Hymenoptera.

Scopoli followed Linnæus and described six species, but one of them was not a true *Cynips*. The same is to be said of Schrank, who enumerated ten species, but of the same mixed character.

In 1764 Geoffroy split up the *Cynips* of Linnæus into two sections—*Cynips* and *Diplolepis*,—the distinction between them lying in the antennæ, "qui in le cinips sont soudées, ou brisées ou cylindriques, au lieu que dans le diplolèpe elles sont longues, filiformes, toutes unies comme celles d'ichneumon et nullement coudées dans leur milieu." The meaning of this is that the name "*Cynips*" was applied to a parasitic species (probably a *Chalcid*), and the name *Diplolepis* was given to a true gall-maker (*C. rosæ*, Linn.). Fabricius, in his earlier works, followed Geoffroy in this allocation of the names, but in the System Piezatorum he reversed them, using "*Cynips*" for the gall-makers (with *rosæ*, Linn., as type), and *Diplolepis* for the Chalcids (*Callimome*, &c.).

The earlier French authors, Latreille, Olivier, &c., followed Geoffroy in using *Diplolepis* for the gall-makers. On the other hand, *Cynips* has been used to designate the gall-makers by Scopoli, Schrank, Spinola, and every author since the time of Latreille, until the name *Diplolepis* was restored to its Geoffroyian meaning by Karsch (Zeits. f. ges. Naturw., liii, p. 287).

That Fabricius acted somewhat arbitrarily in first adopting the names as used by Geoffroy and then using

them in an entirely opposite sense, may be granted; but, on the other hand, it was equally arbitrary to apply the name of "*Cynips*" to a group of insects of which only few species were included in *Cynips* by Linné, the great majority (and certainly the first on the list, which ought, according to the usual custom, to be considered the type) of which were true gall-makers—*Cynipidæ* in the modern sense. Moreover, I cannot look on Geoffroy's names as "genera" in the Linnæan and modern meaning. In his work he did not use the binomial system of nomenclature, and I therefore do not think his names should be adopted at all unless they have been clearly defined and used by his predecessors—defined by them as part of the binomial system of nomenclature. It is true they were at first adopted by Fabricius, but seeing that he afterwards reverted to the name which Linné obviously meant to apply to the gall-makers, and as that name has been applied and become firmly attached to them, I do not feel disposed to follow Karsch in changing the name of the gall-flies to *Diplolepis*. To do so would only lead to needless confusion, without any adequate advantage being gained. Nor would the confusion end here, for *Cynips* would have to be, on the same principle, applied to some Chalcid, or if "*Cynips*," Geof. Fab. (of Sys. Ins.), could not be fixed definitely, dropped entirely.

The same reasoning applies to *Crabro* versus *Cimbex*. *Crabro* was first applied to the saw-fly, now called *Cimbex*, by Geoffroy, but was afterwards applied by Fabricius to an Aculeate; so that, if we are slavishly to stick to the rule of priority, *Cimbex* must now be called *Crabro*, and another name be found for the latter as now understood; a course which would mean endless confusion, without any scientific object being gained.

The *Cynipidæ* belong, in contradistinction to the *Tenthredinidæ*, to the division of Hymenoptera having the abdomen petiolated, *i. e.* not attached by its entire

breadth to the thorax. Their most important distinctive features are:

The abdomen pedunculated; trochanters biarticulated; antennæ twelve- to fifteen-jointed, and never elbowed; prothorax reaching to the insertion of the wings; wings without a stigma, and with one radial and one to three cubital cellules, the second, when present, being minute, usually triangular; the subcostal cellule large, always present, the other cellules badly defined or absent; submarginal nervure absent; abdomen compressed; ovipositor originating close to the base of the abdomen, the borer usually semi-spiral, and with the parts free; larva apterous, never spinning a cocoon; eggs stalked.

The species are small in size, seldom exceeding 5 m.m. in length, and often not more than 2 m.m. As a whole they form a well-defined group, possessing sufficient characteristics which enable the species to be readily recognised from the other groups of Hymenoptera with petiolate abdomen. The *Chalcididæ* are easily separated from them by the wings having a stigma and neither a radial nor cubital cellules, by the antennæ being elbowed, and by the prothorax not reaching to the insertion of the wings. The *Oxyura* agree in the prothorax reaching to the tegulæ, but differ in the antennæ being elbowed, in the wings generally having a stigma, and in the ovipositor issuing from the point of the abdomen. The *Braconidæ* and *Ichneumonidæ* both possess a stigma, and differ in many other points from the *Cynipidæ*.

The Mouth Organs.—The mandibles are short, broad, quadrangular, and bear one, two, or three teeth, either one large apical tooth separated by a deep depression from the basal part, as in *Cynips;* two large, acute, bent teeth, as in *Ægilips*, or three teeth as in *Figites*. Frequently the teeth are not alike. The labium is entire, fleshy, and truncated, or with a curve at the top. The maxilla has usually a large, broad, fleshy outer lobe, the inner lobe obsolete. The labial palpi

are two- to three-, the maxillary four- to five-jointed. They do not afford material for taxonomic purposes.

The Antennæ.—These are never elbowed, nor more than fifteen-jointed. In the ♀ they are from twelve- to fourteen-jointed, and in some species the males have fifteen joints. As a rule the ♂ has one, and in some cases two joints more than the female. In the ♀ the antennæ are much stouter than in the ♂; the joints are thicker, more globose or moniliform, and may be much thickened and enlarged towards the apex. In many *Eucoilina*, for example, the apical two to eight are much thicker than those which precede them, from which they are more or less clearly defined by their being enlarged. It is seldom that they are pilose in the ♀, but the joints may be longitudinally ribbed.

In the ♂ the antennæ are more slender than in the ♀, and are much longer, in some species (*e. g. Psicharca longicornis*) being more than twice the length of the body. The third or fourth joints or both may be incised laterally, as well as thickened, or may be, as in some *Synergi*, greatly enlarged and thickened (see Pl. IV, fig. 22).

The *wings* are seldom much longer than the body, and may be much shorter, or altogether absent. The margin is frequently deeply fringed with long hair, and as often as not the surface is hairy. In one genus (*Keiditoma*) the apex of the fore-wings is more or less incised. There are but few nervures or cellules, and there is never a stigma.

The most important nervures are the subcostal, the basal, the radial, and the cubital. The subcostal (*a*) is never absent. Commencing at the end of the wing, it runs parallel with the costa to near the middle, then turns sharply upwards and unites with it. It may terminate there, or may proceed along the costa to the apex of the radial cellule. If it terminates at the point where it becomes joined with the costa and goes no farther, the radial cellule is called *open*, or *open at the fore margin* (Pl. IV, fig. 20). The subcostal nervure may

further terminate before reaching the costa, thus leaving the radial cellule *open at the base.* On the other hand, if it runs along the costa to the end of the radial cellule (thus giving the costa there a thickened appearance), the latter is called *closed* (Pl. IV, fig. 21). This completeness or incompleteness of the subcostal nervure is of much value in classifying and separating the species.

Next in importance to the subcostal nervure is the radial nervure (*d*). It issues from the subcostal, usually at the point where the latter bends upwards to join the costa. It may be either straight, running almost parallel with the costa, or may curve downwards, then curving up again to join the costa. In *Cynips*, &c., it becomes angled immediately after leaving the subcostal, and may then proceed backwards to unite with the cubital nervure (Pl. IV, fig. 20 *c*). In this case it has the appearance of issuing from the cubital nervure, from which it proceeds in a straight line to the end; and of being united to the subcostal by a short-angled nervure (*b*). The cubital nervure (*e*) issues from the transverse basal nervure (*g*), which is always present. It leaves the basal nervure above the middle, as in *Ibalia;* exactly at the middle, as in *Cynips;* below the middle, as in the *Figitina;* or almost from the middle, as in *Allotrina.* The cubital nervure is not always complete or distinct; it may be entirely obliterated before or behind the areolet, and is usually so faintly indicated as to come into the category of "venæ spuriæ." The median nervure (*f*) is seldom prolonged much beyond the basal nervure, and may be obliterated or very faint.

The radial cellule (3) is always present. In shape it is narrow and elongated, not angled in the middle, as in *Cynips*, *Dryophanta*, and other gall-makers; or short, broad, and angled or curved in the middle, as in the parasitic species.

In the former case the second cubital cellule (areola or areolet) (6) is at its base (Pl. IV, fig. 21); in

the latter in the middle (Pl. X, &c.). The first (4) and third (7) cubital cellules are seldom complete, this being more particularly the case with the third.

The second cellule (areolet) (6) is either completely closed, as in *Cynips*, closed laterally and open on the lower side, as in some *Figitides*, or entirely absent, its position being represented merely by a thickening of the nervures, the transverse cubital nervures being obliterated, as in *Kleditoma*, &c.

According to some authors (see Osten-Sacken, Proc. Ent. Soc. Phil., 1861) the radial nervure issues from the areolet; thus they do not regard the little angled nervure (*c*) as part of the radius, and call it the "second transverse nervure;" the first being, according to them, what I call the transverse basal. If this view be correct, then the radial cellule is bounded by three nervures, by the subcostal, the "second recurrent," and by the radial nervure proper. It appears to me, however, that it is simply the first abscissa of the radius, and not a distinct nervure. If it be regarded as one of the recurrent nervures it will differ in position from all the other *Hymenoptera*, which always receive the recurrent nervures in the cubital cellules and on the under side. A reference to the *Braconidæ* will, however, show to us that it is undoubtedly the first abscissa of the radius, the only difference between it and a Braconid (say *Agathis*) being that it is elbowed.

The thorax is well developed. The prothorax laterally reaches to the tegulæ, the pleural region being large and prominent. In front it is very slightly developed, usually transverse or nearly so, and bearing a keel which (especially in the middle) is usually very prominent. In some genera it is incised in the middle, or projects into two tubercle-like bodies. The mesothorax is usually convex above. The parapsidal furrows are in many genera present, and may be complete or reach only half-way. They may be smooth, crenulated, or punctured. The mesopleura has generally an oblique depression in front. Sometimes (*e. g.*

Figites) the mesopleura is separated from the sternum by a keel. The scutellum is large, and varies considerably in form. With a few exceptions it has one, or more often two, foveæ at the base. In *Allotria* it is but little prominent; in other genera (*Cynips*, many *Figitina*, &c.) it is raised, ovate, or orbicular; in the *Eucoelides* it is large, and bears on the top a more or less deep cup-like depression, and in this group, further, its edge is distinctly margined, and frequently projects more or less sharply; in *Onychia* it is channelled; in *Aspicera*, *Ægilips*, and some other genera, the top or apex is produced into a sharp or blunt spine or projection. In sculpture it may be alutaceous, punctured, rugose, or perfectly smooth; it may be shining or opaque.

The metathorax (and the median segment) is usually overhung by the large projecting scutellum. The metanotum is of very small dimensions, being almost hid between the scutellum and the median segments. The metanotal, pleural and sternal regions are, however, perfectly distinct, as is also the metanotal stigma.

The median segment, unlike what we found in the *Tenthredinidæ*, is distinctly separated by the petiole from the abdomen, and forms more than it does in the last-named family an integral part of the thorax. It is well developed posteriorly, and frequently bears longitudinal keels, or may have more or less clearly defined areas, or may be reticulated. The stigma of the median segment is large. As in the *Tenthredinidæ*, the ventral portion of the median segment is aborted.

It may be noted that English writers, when describing the aculeate or parasitic section of the *Hymenoptera*, call all that part of the thorax behind the scutellum the "metathorax;" whereas there are really two segments,—namely, the metathorax, or third segment (= the post-scutellum *auct.*), and Latreille's median segment, or fourth thoracic segment; that is to say, the thorax is composed of four distinct segments.

In descriptive Hymenopterology it is the median segment which is the more important of the two; for it is that which bears the areæ, reticulations, and keels so important ormisologically in the *Ichneumonidæ* and other groups. In this work I have used the term "median segment" to mean the fourth thoracic segment, and as practically equivalent to the metathorax of other writers, *e. g.* Thomson and Foerster. It is frequently covered with woolly hair, especially in the parasitic species.

The *legs* are moderate in size, sometimes the hinder legs are rather elongate (*e. g. Ægilips*). The trochanters are biarticulate; the fore tibiæ bear one or two spurs, the hind pair two unequal spurs. The tarsi are five-jointed. As a rule the metatarsus is as long as the succeeding three joints united. The claws are simple as in *Cynips*, or cleft as in some species of *Andricus* and *Neuroterus*. The patellæ are seldom prominent.

The *ovipositor*.—This in its morphological structure agrees quite with the rest of the *Hymenoptera*, although exhibiting some peculiar features. It occupies the entire length of the abdomen, and in some species is nearly as broad as it. Looking at it as it lies in the abdomen, we find a broad chitinous plate (the oblong plate of the *Tenthredinidæ*, see Vol. I, Pl. X, fig. 5), which is divided into an anterior or upper, and a posterior or lower part, in addition to the small triangular plate. At the base it forms a semicircle, or at least is broadly rounded. The anterior part is attached to the lower end of the triangular plate (Pl. V, fig. 15 *d*), and more or less firmly to the base of the posterior. It becomes narrowed towards the apex, but before the apex there is frequently a rounded projection; and on the opposite side of the apex there is a papilla-like body (the anal papilla, figs. 15 *f* and *j*). Broad at the base, the posterior piece becomes narrower from the basal third or so, but the apical fourth or more of it in some species is broader and distinctly separated from the basal part, it representing the sheath (Vol. I, Pl. X, fig. 5) of

the *Tenthredinidæ*. Sometimes there is a projection with a hook-like point at the base not far from the apex. The triangular plate is shaped pretty much as it is in the saw-flies (Pl. V, fig. 15 *d*). The two pieces of the sheath are united to form a channel in which the boring part of the ovipositor works; but it is not so firmly united at the base. Here (Pl. V, fig. 15 *c*) there is a horny projection by means of which it is attached to the posterior chitinous piece. The long, thin, wire-like boring pieces are usually toothed at the apex. As with the other *Hymenoptera*, they are only attached to the triangular piece (Pl. V, fig. 15, *a* and *b*).

Thus, except in form, there is no radical distinction between the ovipositor of *Cynips* and the saw-fly beyond the sheath in the former being united. In the different groups, and even species, there is great variety in the form of the chitinous lateral pieces; and apparently their forms may be used advantageously in separating the species.

The different parts are worked by five muscles.

The form of the abdomen varies considerably. In some the first segment or petiole forms a long, thin, rod-like peduncle, while in other species it is so thick as to make the abdomen almost sessile. In form the abdomen may be ovate and thick, long, slender, and knife-shaped, or cultriform. It is seldom very much longer than the thorax, and may be even shorter than it, especially in the males.

The number of the segments apparent is seven in both sexes, with one less on the ventral region in the females, and two less in the males. The relative lengths of the segments vary (see Pl. XIV), and this fact is important from a classificational point of view, especially the length of the second and third. Except with *Ibalia*, either the second or third segment is very much longer than all the others united, and one of them may, indeed, form more than three-fourths of the total length of the abdomen. In the females the

apical ventral segment is much larger than the others, and in the gall-making species is frequently plough-share-shaped, the apex being usually produced into a sharp point, which is frequently hairy.

As regards the *life-history* of the family, we find three well-marked modes of existence,—gall-making species, inquiline species, and parasitic species. In the first group the females deposit their eggs in the living tissue of plants in such a way that they are brought into contact with the cambium layer. This contact causes a more or less complicated structure or gall to form round the egg. On the juicy substance found in the gall immediately surrounding it the larva lives, feeding only during the period that the gall is succulent, necessarily a short time. The part with which it is surrounded becomes hardened, forming a round cell, in which it passes the quiescent larval condition as well as the pupa state, and finally emerges from it as a perfect insect. They are thus purely vegetable feeders, in which respect the inquilines agree with them, only they do not form or give origin to galls themselves. They deposit their eggs in galls raised by the true gall-flies for their own progeny when the galls are still soft and juicy, and before the gall-fly larva has reached any size. Being of a more rapid and vigorous habit than it, the inquiline larva eats up the available food, and crushes the legitimate tenant out of existence. This does not always happen in large galls where there is a sufficient supply of nourishment for both, but it may be said to be invariably the case in the smaller galls. Sometimes there may be only one inquiline larva in a gall if the latter be small, but in the larger galls there may be as many as five or six. The presence of the inquiline larvæ in a gall causes it to become more or less distorted, and frequently enlarged. They also cause monothalamous galls to become many-celled. Thus, if the galls of *Rhodites eglanteriæ* were left in the possession of the *Rhodites* larva, it would be thin-walled and

have a large central cavity; inhabited by the inquilines it becomes enlarged, swollen, and many-celled, the cells being separated by partitions of spongy cellular matter. Lastly, the species of the third section are true animal parasites, living, like the *Ichneumonidæ*, on other insect larvæ, chiefly *Diptera* and *Homoptera*.

The modes of reproduction in the *Cynipidæ* show some highly interesting and instructive features. So far as our present knowledge extends, the parasitic species reproduce themselves in the normal way—by males and females; and this is also the case with many gall-making and inquiline species. But we find also among them undoubted evidence of parthenogenetic reproduction, either complete or incomplete.

The genus *Ceroptres* apparently furnishes an example of both kinds. Thus Mayr bred over 600 specimens of *C. arator*, Htg., without finding a single male among them; of *C. cerri* Mayr reared ninety-eight females and only four males (Verh. z.-b. Ges. Wien, xxii, p. 672). In one small lot of bedeguar galls I found no great disparity between the sexes, although the females were certainly more numerous, but from other breedings the males have been in the proportion of one male to over 100 females. Adler (B. E .Z., p. 217), from extensive and careful observations, finds also that the males, in proportion to females, are very rare. He has furthermore proved by direct observation that *Rhodites rosæ* can produce fertile eggs without being fertilized. Among the oak-gall flies complete parthenogenesis among single-brooded species is common; in fact, not one single-brooded species is known to have a male, parthenogenesis among such being universal, *e. g. Andricus quadrilineatus*, *A. albopunctatus*, &c.

Still more remarkable is the occurrence of alternation of generation among the gall-making species—of species having a bisexual spring generation reproducing sexually, followed by an autumnal unisexual brood, reproducing parthenogenetically. Besides this physiological distinction between the two broods, there are

important morphological differences. They differ frequently in sculpture and coloration; the form of the antennæ seldom is the same; often there is a difference in the alar neuration; nay, one brood may be winged, the other apterous. Generally the form of the ovipositor shows a marked distinction in form, a difference correlated with a difference in the mode and position of ovipositor. In no case are the galls of the dimorphic species alike. Thus the gall inhabited by the spring form may be soft and juicy, the autumnal hard and woody. The position of the galls is also seldom the same. They may even be on different species of plants.

The habits of the parasitic *Cynipidæ* are, broadly speaking, tolerably uniform. The perfect insects are, if anything, sluggish. When alarmed they have a knack of tucking the antennæ, wings, and legs close to the body and falling down as if dead, remaining in that inert position until they consider danger is over. The *Allotrina* apparently confine their attacks to *Aphidæ* or to the parasites of *Aphides*. It is true that both Hartig and Kirchner (Cat., p. 31) record rearing species from the galls of *Nematus Vallisnieri*, but they feed not on the *Nematus* larva, but on *Aphidæ* which have wandered into the galls probably after having been stung. The plant lice tenanted by *Allotrina* remain attached to the leaf, and may be recognised by their dried bodies. The *Figitina* are chiefly parasites on dung dipterous larvæ (*Sarcophaga*). The *Eucoelina* are also attached to *Diptera—Musca*, *Eristalis*, *Tachina*, and *Agromyza*. One species (*E. minuta*) is found on *Scolytus rugulosus* according to Giraud. The *Onychina* and *Anacharina* are more varied in their attacks. *Onychia Westwoodi* preys on a beetle larva which feeds on *Caltha palustris*; *Callaspidia ligurica* on a *Syrphus* (Giraud, l. c.), and *Anacharis* on *Hemorobius*. *Ibalia* feeds on *Sirex*.

Classification.

The first naturalist who placed the classification of the *Cynipidæ* on a satisfactory basis, as regards the division into groups larger than genera, was Hartig (Germ. Zeit., i, ii, iii). His system was as follows:

I. *Cynipides.*—The first [second] abdominal segment longer than the others. This was divided into two sections:

1. Species with a narrow, elongated, radial cellule, having the areolet at its base. This contained the true gall-makers.

2. Species with a broad and short radial cellule, having the areolet in its middle. This comprised the inquiline species (*Synergus*), *Allotria*, *Cothonaspis*, and *Megapelmus*.

II. *Figitides.*—The first [second] abdominal segment longer than all the others = *Figitides*.

III. *Ibalides* [Hartig included this tribe in the *Figitides*].—The abdominal segments equal in length, strongly compressed, cultriform.

C. G. Thomson (Œf., 1861) introduced a decided improvement into the classification by dividing the tribes into sub-tribes. Of the former he had three —*Cynipina* (this group was not defined by him in the above paper, which dealt only with the parasitic species), *Inquilinæ*, and *Parasiticæ*.

The "*Parasiticæ*" were divided into three subgroups:

I. *Eucoelidæ*, distinguished, *inter alia*, by the cup-shaped depression in the scutellum, and by the second abdominal segment being "maximo, reliquiis brevissimis."

II. *Ibalidæ*, having no cup-shaped depression on the scutellum; the abdomen compressed, and with segments 2—6 equal.

III. *Figitidæ*, which are merely described as having no fovea on the top of scutellum, and the antennæ

thirteen-jointed in ♀ and fourteen in ♂ ; so that this third group merely differs from the first in not having a cup-shaped depression, and in the ♂ having one joint less in the antennæ.

The "*Figitidæ*" were divided by Thomson into—

i. The *Allotrina*, with the second abdominal segment longer than the third and sub-sessile.

ii. The *Anacharina*, *Figitina*, and *Onychinia*, which all differ from the *Allotrina* in the abdomen having the second segment not, or but little, longer than the third. The three sub-tribes were separated by the relative lengths of the second and third segments of abdomen.

In a subsequent paper (Opus. Ent., p. 778) Thomson divided the family into four groups—*Cynipina*, *Allotrina*, *Figitina*, and *Ibalina*,—and pointed out a new character whereby they might be distinguished, namely, by the position occupied by the cubitus on the transverse basal nervure.

A valuable and instructive paper was publised by Foerster in 1873 (Verh. z.-b. Ges. Wien, xix). Here we have defined three main groups : first, *Ibalina;* second, the *Cynipina;* and third, the parasitic spcies, which were distributed among five sub-families of equal value to the *Ibalina* and *Cynipina*—namely, the "*Allotrioidæ*," the "*Eucoeloidæ*," the "*Megapelmoidæ*," the "*Onychioidæ*," and the "*Figitoidæ*."

Reinhard monographed (B. E. Z., iv, 204–45) the central European species of *Figitides*, and united *Megapelmus*, &c., with *Figites*, from which they were separated by Hartig. He described the *Figitides* (which comprised the *Onychina*, *Figitina*, and *Anacharina* of Thomson) thus :

> Antennæ maris quatuordecem-, feminæ tredecem-articulatæ.
> Segmentum secundum dimidio abdominis brevius.
> Alarum cellula radialis latitudine ad summum duplo longior.

A useful and admirable work followed in the same year from Giraud. The lamented author divided the

family into three sections—*Gallicoles*, *Aphidivores*, and *Figitides*,—but only defined them in general terms.

Walsh (Proc. Ent. Soc. Phil., ii, 1864, p. 468) divided the family into two groups:

"*Cynipidæ*.—Venter visible nearly throughout its entire length ♂ ♀, more conspicuously so in ♀, or if retracted within the abdomen, leaving a gaping suture below. The joint, which is apparently the last ventral, and which for convenience I call in ♀ the 'ventral valve,' very long, and forming in ♀ a sheath-like receptacle, convex below, concave above, which is occupied by the ovipositor. Sheaths of the ovipositor, erected in repose either vertically or obliquely backwards and upwards, and strongly divaricate with the 'ventral valve.' Dorsal joints of the abdomen free, except in certain genera the suture between the second and third dorsal, and probably in *Ibalia* the suture between the sixth and seventh dorsal, which are connate. Tip of the ♀ abdomen bluntly and widely rounded or truncate. Tip of the ♂ abdomen angular or subangularly rounded, and only when the terminal segments are retracted, truncate, joints 4—7 being each vertically narrower than the preceding one.

"*Habits*, so far as known, gallivorous.

"*Figitidæ*.—Venter retracted within the abdomen, with the suture below barely perceptible, entirely internal and invisible ♂ except a minute portion of its tip, entirely so in ♀ except the tip of the terminal point, which tip is horny, vertically flattened, and acutely angular, and, in close conjunction with the similarly shaped terminal dorsal joint forms an angular horny borer. Concealed between the dorsal and ventral pieces of this borer lie the ovipositor and its sheaths. Sheaths of the ovipositor horizontally porrect. Dorsal joint of the abdomen free, except the suture between joints 2 and 3, which is connate. Tip of the abdomen truncate, joints 4—7 being each vertically nearly as wide as the preceding one, except

that joint 7 is often excised below, and shows underneath it a small portion of the tip of the last ventral.

"*Habits*, as far as known, insectivorous."

Practically the same classification is adopted by W. H. Ashmead (Trans. Am. Ent. Soc., xiii, p. 59). He divides the family into two sections:

i. Gymnogastri. Venter visible, or visible for more than half its length; radial area long and narrow.

ii. Cryptogastri. Venter not visible, or with the tip alone occasionally exposed; radial area an equilateral triangle.

The Gymnogastri contain three groups:

Ibaliniæ.—Radial area closed; abdomen cultriform; segments about equal; venter visible.

Cynipinæ.—Radial area *seldom closed;* second abdominal segment occupying half or but little more than half the whole surface of abdomen; venter visible.

Inquilinæ.—Radial area *seldom open;* second abdominal segment occupying the whole or nearly the whole surface; venter not visible its whole length.

The Cryptogastri are divided into two "subfamilies:"

i. *Allotrinæ*.—Abdomen short, globose or semiglobose; second abdominal segment longer than the other; scutellum round, convex.

ii. *Figitinæ*.—Abdomen elongate, ovate, compressed, with the apex more or less pointed; third abdominal segment the largest; scutellum quadrate, cupuliform, or spined.

From the preceding sketch of the systems of classification proposed by the chief writers on the subject, it will be observed that great stress is laid on the relative lengths of the abdominal segments for the primary divisions. As used by Hartig it can only be regarded as an artificial method of separating the species, for it separates the *Eucoelinæ* from the *Figitides*, with which they are much more nearly related than they are to the gall-making species. Even as used by Foerster it will separate true gall-makers from others of precisely

similar habits, and with which structurally they are in the closest agreement. Thus Foerster's definition for the gall-makers—"The second abdominal segment quite half the abdomen (excluding the first) or longer"—will not apply to some species of *Aulax* which have the second segment not much longer than the third, and certainly considerably shorter than half the length of the whole abdomen. *Aulax rhœadis*, in fact, agrees with Reinhard's definition of the *Figitides*,—second abdominal segment half or shorter than half the length of the abdomen. I cannot consequently look upon the relative length of the abdominal segments as a character of primary taxonomic value.

The division into *Gymnogastri* and *Cryptogastri* is not altogether satisfactory. Clearly the distinction in the form of the radial cellule given by Ashmead cannot hold good; for in many *Allotrinæ* the radial cellule is quite as "long and narrow," if not even more so, than it is in species of *Aulax* or *Synergus*. And in certain species of the latter genera the venter is quite as much hidden as it is in *Allotria*. It is indeed difficult to find any absolute characters which can be used for purposes of classification; for, whatever structure we may use, we find a gradual gradation from the extreme to the mean when we trace it through the various genera in the family. But although this is the case we can, by employing various characters, divide the group into four more or less clearly defined sub-families. These four groups have a general, but not absolute identity in habits. Thus, while the majority of the *Cynipina* are attached to galls, either as gall-makers or inquilines, yet one species at least is parasitic, *Diastrophus aphidivorus*, Cam.

A. Basal four abdominal segments subequal; abdomen semi-sessile; a stout process on the second joint of hind tarsi. Radial cellule elongated, the three cubital cellules complete, the second placed opposite the base of the radial cellule; cubitus complete and issuing from above the middle of the transverse basal nervure. *Ibalina.*

B. Basal segments of abdomen not subequal nor subsessile; no process on hind tarsi:

1. Radial cellule elongate as a rule, the areolet placed opposite to, or at least not much beyond, the base of the radial cellule; cubitus issuing from the middle of the transverse basal. The three cubital cellules usually complete. Hind tibiæ with two spurs. Body with some sculpture, seldom entirely impunctate; scutellum alutaceous, punctured or rugose. Second abdominal segment generally considerably longer than any of the others; usually one half the length of abdomen. Venter not hid by the overlapping dorsal segments, but exposed for half or its entire length. Ovipositor spiral or semi-spiral. Hypopygium acute or ending in a projecting hairy point. Gallicolous. *Cynipina.*
2. Radial cellule broad, the areolet not situated opposite its base; the first and second cubital cellules never complete, the cubitus issuing (when indicated) from near the middle of the transverse basal nervure; scutellum generally without a fovea at the base. Abdomen short, ovate, not compressed laterally, obliquely truncated, with the second segment the longest. Body impunctate (including scutellum). Hind tibiæ with one spur. Antennæ longish, sometimes filiform. Areolet situated a short distance in front of the base of radial cellule. Radial cellule variable, frequently elongate. *Allotrina.*
3. Scutellum rugose or punctured, raised, with a more or less deep cup-like depression on the top, the cup usually with a a clearly defined margin, sometimes projecting, foveate at base. Radial cellule wide, the areolet at the middle, never opposite the base. The first and second cubital cellules (sometimes also the third) incomplete. Cubitus issuing from below the middle of the cellule. Second segment longer than any of the others, usually half the length of abdomen, and in most cases with a dense hair fringe at the base. *Eucoelina.*
4. Scutellum punctured, rugose, or alutaceous, sometimes channelled or spined, foveate at base, but never with a cup-like margined depression. Second abdominal segment not half the length of the abdomen. Radial cellule short, broad, triangular, the areolet near the middle. Cubitus when present issuing from below the middle. Cubital cellules generally all incomplete. Abdomen elongate, often compressed, acute at apex. *Figitina.*

Sub-family FIGITINA.

The chief characteristics of this sub-family have been already given above. Structurally the species show much greater variety (especially in the form of the head, thorax, and abdomen) than do either the *Eucoelina* or *Allotrina;* but they do not appear to be quite so numerous in species.

The group is divisible into three sections, considered by Foerster and others to be equal in rank to the *Allotrina* and *Cynipina*.

A. Abdomen sessile, not petiolate, the second segment shorter than the third.
   (*a*) The second segment not produced above into a tongue-shaped process, shorter than the third. Scutellum not channelled. *Figitides.*
   (*b*) The second segment produced above into a tongue-shaped process, much shorter than the third. Scutellum channelled. *Onychides.*

B. Abdomen petiolate, sometimes with the petiole very long; the second segment somewhat longer than the third. Scutellum with two foveæ at the base. *Anacharides.*

Figitides.

Abdomen almost sessile, the petiole being very short; the second segment shorter than the third, and not produced into a tongue-shaped process on the upper side. Cheeks usually margined. Mesonotum with the parapsidal furrows usually complete. Antennæ stout, seldom filiform, 13-jointed in the ♀, 14 in ♂, the third joint in the latter sinuated. Cubital nervure issuing from the lower part of the basal nervure. Areolet situated beyond the apex of the second abscissa of radius, complete or incomplete. Eyes bare or hairy; radial cellule closed or open. Scutellum not sulcated, rarely with foveæ at its base; often rugose.

Synopsis of Genera.

1 (4) Eyes hairy.
2 (3) Mesopleuræ separated from sternum by a ridge. *Figites.*
3 (2) Mesopleuræ not separated from sternum by a ridge. *Pycnotrichia.*
4 (1) Eyes bare.
5 (8) Cheeks not margined; prothorax with a gradual slope.
6 (7) Scutellum with a fovea at its base; head and thorax shining. *Lonchidia.*
7 (6) Scutellum without a fovea at its base, head and thorax opaque, alutaceous. *Anolytus.*
8 (5) Cheeks margined, prothorax abrupt.
9 (10) Thorax opaque, finely granulated. *Amblynotus.*
10 (9) Thorax shining.
11 (12) Scutellum rugose; second abdominal segment hairy; areolet open at the side, not situated near the base of radial cellule. *Sarothrus.*
12 (11) Scutellum not rugose, second abdominal segment bare; areolet complete laterally, situated near the base of the radial cellule. *Melanips.*

The only European genera not found yet in our fauna are—

(1) *Homorus*, Foerster, which agrees with *Pycnotrichia* in the absence of the mesosternal keel, but differs from it in having the middle joints of the flagellum not longer than broad, the third joint in the ♂ strongly incised, while the second abdominal segment is not hairy; and—

(2) *Tryschiza*, Foerster, which agrees in most points, *e. g.* in having the thorax smooth, shining, the eyes bare, and the third joint of the antennæ in ♂ straight, but has an open radial cellule. The type is *Figites agaricolarum*, Dbm., and the type of *Homorus* is *Figites abnormis*, Giraud and Reinhard.

Genus—FIGITES.

Figites, Latr., H. I., xiii, 210; Gen. Crust., iv, 19; Giraud, Verh. z.-b. Ges. Wien, x, 147.
Psilogaster, Htg., Germ. Zeit., ii, 187 (pt.).

Pronotum with a semi-vertical slope in front. Frontal sutures distinct; eyes hairy; cheeks margined. Mesopleura separated from the sternum by a keel. Parapsidal furrows distinct. Scutellum rounded, rugose, with two foveæ at the base. Antennæ in ♀ short, thick, the joints globose or moniliform, thickened towards the apex; in ♂ the third joint is excised. Radial cellule closed; cubitus and areolet obsolete; the margin is sometimes fringed. Petiole raised, short, thick, canaliculated. Thorax shining. Abdomen short; the base striolate, slightly compressed laterally. Head more or less rugose.

A genus well known by the keel on the mesopleuræ. The species are common and of wide distribution, and are parasites on Diptera.

Synopsis of Species.

1 (4) Wings not fringed at apex; scutellum rugose at its base.
2 (3) Pleuræ striolated only at the bottom, mesonotum keeled along the parapsidal furrows. ♂ with the base of abdomen striated. *Scutellaris.*
3 (2) Pleuræ striolated at top and bottom; mesonotum with the parapsidal furrows not keeled. ♂ with second abdominal segment smooth. *Consobrinus.*
4 (1) Wings fringed; scutellum not deeply rugose at base.
5 (6) Legs red; vertex punctured. *Anthomyiarum.*
6 (5) Legs black; the tibiæ reddish. *Nitens.*

1. Figites scutellaris.

Pl. VIII, fig. 3.

Cynips scutellaris, Rossi, F. E. Mant., ii, App., 106.
Figites scutellaris, Lat., N. H., xviii, 220; Gen. Crust. Ins. iv, 19, and Tab. 12, fs. 4 and 5; Gir., Verh. z.-b. Ges. Wien, x, 152; Reinh., B. E. Z., iv, 230.
Ophion abbreviator, Pz., F. G., 73, 16.
Psilogaster tibialis, Htg., Germ. Zeits., ii, 203.

Black; the knees, four anterior tibiæ, and tarsi reddish; the tips of anterior tarsi and the hinder pair entirely fuscous; wings hyaline, bare, the nervures piceous. Head rather densely covered with pale pubescence, rugosely punctured, the punctures running into irregular reticulations; the oral region and vertex in the centre smooth, shining. Thorax sparsely pilose, shining; the lower part of the propleuræ longitudinally striolated, especially in front; the upper part aciculated, and with some scattered punctures, or indistinctly striated in front; mesopleuræ longitudinally striolated, the upper part not very strongly behind, in front aciculated. Mesonotum shining, impunctate, the parapsidal furrows complete, and having at the base on the inner side a fine keel running along them to the middle, and a fine furrow on the outer side. Scutellum with large irregular rugose furrows, the central very broad and deep; foveæ large, deep, broader than long, finely striated, the apex sharp and rounded, margined. Median segment rugose, pilose, a tubercle at the stigma; looked at from above the middle segment is seen to have two blunt tubercle-like teeth on either side. The abdomen not much longer than the thorax; the petiole and the basal segment longitudinally striolated. Wings transparent, milky white, glabrous, the edges without a fringe; radial cellule somewhat longer than broad; the first abscissa of radius longer than the second; areolet incomplete; the apical nervure only present, spurious nervures completely absent.

The ♂ has the third joint of the antennæ cylindrical, the second abdominal segment striolated.

Length 3—5 m.m. ♀; ♂ 3—4 m.m.

Bred from pupa of *Sarcophaga striata*. Clydesdale, Dumfries, Ayrshire, London district.

Continental distribution: Sweden, Germany, Holland, France, Pyrenees, Italy, Dalmatia.

2. Figites consobrinus.

Plate VIII, fig. 4.

Figites consobrinus, Gir., Verh. z.-b. Ges. Wien, x, 153; Reinh., B. E. Z., iv, 232; Thoms., Oef., xviii, 415.

Black; the knees, the four anterior tibiæ and tarsi reddish, more or

less fuscous; the flagellum fuscous beneath; wings glabrous, whitish-hyaline. Head rugosely punctured, covered with whitish hair; the clypeus and the vertex in the centre smooth. Thorax shining, covered sparsely with longish white hair; pleuræ longitudinally striolated, except a small space behind on the upper part, the space on the mesopleuræ being larger in proportion than that on the propleuræ. Mesonotum shining. Scutellum rugosely punctured; foveæ wider than long; median segment with four obtuse teeth. Petiole and base of abdomen striated.

The ♂ has the base of the abdomen smooth, the third joint of the antennæ cylindrical.

Length 3—4 m.m. ♀; ♂ 3 m.m.

This species is very nearly related to *F. scutellaris*, but is probably distinct. The differences lie in *consobrinus* having the pleuræ entirely striolated, while in *scutellaris* they are not striolated on the upper part; the mesonotum wants the longitudinal keels; the last antennal joint is shorter and thicker compared to the penultimate; the flagellum is fuscous or brownish beneath; the ♂ has the base of the abdomen smooth, not striated, and generally it is a smaller species; but both species vary in size.

It was bred by Giraud from pupæ of *Sarcophaga*, along with *F. scutellaris*.

Not very common. Clydesdale, Ayrshire, Dumfries, Kirkcudbrightshire.

Continental distribution: Sweden, Germany, France.

3. FIGITES ANTHOMYIARUM.

Plate VIII, fig. 5.

Figites anthomyiarum, Bouché, Naturg., 165. 57.
Psilogaster striolatus, Htg., Germ. Zeits., i. 202, 3.
Figites lævigata, Dbm., Skand. Hym., 23, 9.
— *fulvipes*, Dbm., Onych., 3, No. 9.
— *anthomyiarum*, Dbm., Skand. Hym., 20, No. 6; Thoms. Oef., xviii, 415, 6.
— *striolatus*, Reinh., B. E. Z., iv, 232, 3.
— *apicalis*, Gir., Verh. z.-b. Ges. Wien, x, p. 151?

Black; the flagellum more or less, and the legs, except the coxæ and apices of the tibiæ, reddish-yellow; wings hyaline. Antennæ stout, longitudinally striated, sparsely haired, the hairs longish. Face rugose, the cheeks, vertex, and front smooth, the vertex sometimes aciculate; sparsely covered with longish hair. Thorax shining, sparsely

haired; the pleuræ striolated, not so strongly at the edges. Scutellum punctured, less strongly at the base; the basal foveæ large, roundish, shining, the apex of scutellum subtruncate. Parapsidal sutures distinct; two short lines at the base of mesonotum. Median segment at the stigma projecting as a short tubercle, the central keels distinct but somewhat irregular; the whole of the median segment is rough. Petiole stoutly longitudinally striolated; the base of the second segment striated. Wings clear hyaline, the nervures testaceous, the apex ciliated.

The ♂ differs in having the antennæ longer than the body, the flagellum almost entirely reddish-yellow, the third joint slightly incised, the scutellum is not so strongly punctured, the face shining, smooth, the base of the second abdominal segment is not striolated, and the femora are largely lined with black.

Length 2·5—3·5 m.m.

The colour of the antennæ in the ♀ varies, some specimens having the flagellum almost entirely black, while others have it for the greater part reddish; in the ♂ it is usually entirely reddish-yellow, but sometimes it is largely infuscated towards the apex. In the ♀ the hind femora may be more or less infuscated. The striolation on the thorax varies in intensity.

In the coloration of the legs it agrees best with *P. urticarum*, but the keel on the mesosternum offers a ready means of separation.

The larva, according to Bouché (l. c.), is one line long; longish, narrowed posteriorly, contracted in the middle, white, soft, uneven, and very finely wrinkled. Head roundish; the mandibles yellow, brown and bidentate at the apex. The mesothorax is strongly enlarged, larger than the other rings. The metathorax and the first abdominal segment are strongly narrowed, forming a sort of waist. Abdominal segments have a convex back; the anal segment small, rounded. Stigmas pale yellow.

The larvæ were found by Bouché in the harvest and winter in the pupæ of species of *Anthomyia,—dentipes*, *floralis*, &c.

Not uncommon. Clydesdale; Cheshire. August and September.

Continental distribution: Sweden, Germany, Austria, France.

4. FIGITES NITENS.

Pl. VIII, fig. 6.

Psilogaster nitens, Htg., Germ. Zeits., iv, 418.
Figites coriacea, Dbm., Onyc., 22, 8.
— *larvarum*, Dbm., l. c., 21, 7.
— *nitens*, Reinh., B. E. Z., iv, 235; Thoms., Oef., xviii, 415.
— *fuscinervis*, Gir., Verh. z.-b. Ges. Wien, x, p. 150.

Black; the knees, tibiæ, and tarsi reddish, the hind tibiæ and tarsi (especially towards the apex) infuscated; flagellum inclining to fuscous, shining, covered sparsely with longish, fuscous hair. Head shining, impunctate, except the face, which is rugose. Thorax shining, pleuræ longitudinally aciculate; scutellum shining, the apex punctured; the foveæ large, deep, longer than broad. Median segment punctured, without teeth or tubercles. Petiole longitudinally striolated; base of the second segment striated. Wings clear hyaline, the nervures fuscous, the apex ciliated. ♀.
Length 2—3 m.m.

A smaller species than *F. anthomyiarum*, differing from it in the antennæ being shorter and darker coloured; the head is more shining, and in no way punctured on the top; the femora are black; the tibiæ and tarsi much more darkly coloured; the radial cellule is shorter, and the spurious nervures are more distinctly traced. The ♂ is easily known from the same sex in *anthomyiarum* by the last joint of the antennæ being only about three times longer than broad, and not five or six times.

Rare. Dalry, Ayrshire.

Continental distribution: Germany, France.

Genus—PYCNOTRICHIA.

Pycnotrichia, Foer., Verh. z.-b. Ges. Wien, xix, 363 and 366.

Eyes hairy; cheeks margined. Thorax smooth, shining; parapsidal furrows complete. Scutellum flattish; smooth in front, rugose behind; bifoveate at the base; pleuræ not separated from the sternum by a ridge. Petiole shining; second abdominal segment glabrous. Radial cellule closed, elongate; cubitus and areolet obsolete. Antennæ stout, longer than the thorax; the joints in ♀ longer than broad.

Apart from the absence of a longitudinal keel over the mesosternum, this genus does not differ from *Figites*.

1. Pycnotrichia urticarum.

Pl. VI, fig. 1.

Figites urticarum, Dbm., Skand. Hym., 16, 3; Thoms., Oef., xviii, 414, 2.
— *lævigatus*, Reinh., B. E. Z., iv, 233, 4.
— *politus*, Gir., Verh. z.-b. Ges. Wien, x, p. 151.

Black, shining; head and thorax sparsely covered with fuscous hair; head smooth, the face for the greater part rugose; scutellum finely rugose, smooth at the base; median segment opaque, not toothed. Antennæ longer than the body, the third joint slightly sinuated, the flagellum fuscous-red, infuscated towards the apex. The second segment of the abdomen is smooth, not striated at the base. The pleuræ rugosely aciculate, the centre and the anterior part smooth. Legs fuscous-red, the coxæ black; the femora lined above and beneath with black; apices of tarsi black. Wings clear hyaline, the nervures testaceous, the apex ciliated, the spurious vein traced to near the apex. ♂. Length 2·5—3 m.m.

The ♀ I have not seen, nor is it described by Reinhard or Thomson. If it be *politus*, Gir., as suggested by Reinhard, l. c., it has the antennæ deep black, of the length of the head and thorax, slightly thickened, submoniliform; the joints of the flagellum longer than broad, the last an elongated oval, twice longer and very little thicker than the preceding.

Not common. Clydesdale.

Continental distribution: Sweden, Germany.

Genus—Amblynotus.

Melanips (Haliday), Walker, Ent. Mag., iii, 161 (pt.).
Scytodes, Htg., Germ. Zeits., ii, 187.
Amblynotus, Htg., l. c., iii, 419.
Melanips, Foerster, Verh. z.-b. Ges. Wien., xix, 366.

Antennæ filiform, not, or scarcely, thickened towards the apex; the third joint incised in the ♂. Eyes bare; cheeks margined. Thorax opaque, finely granulated; scutellum opaque (not rugose), ovate. Parapsidal furrows present, but not very distinct. Abdomen ovate, somewhat compressed; its second segment with a slight hair fringe, and equal in length with the third; petiole smooth. Radial cellule closed; cubitus distinct; areolet complete, longer than broad.

A. *Parapsidal furrows complete and distinct. The third joint of antennæ in ♀ longer than the fourth.*

1. Amblynotus opacus.

Pl. VIII, fig. 1.

Scytodes opacus, Htg., Germ., Zeits., ii, 202.
Amblynotus opacus, Reinh., B. E. Z., iv, 223, i, Tab. iv, f. 4, ♂; Thoms, Oef., xvii, 416, 1.
Melanips opacus, Gir., Verh. z.-b. Ges. Wien, x, 166, 4.

Black; the flagellum more or less on the under side, the femora, tibiæ, and anterior tarsi, red. Head and thorax opaque; abdomen shining, very finely punctured; head and thorax (except a shining space on the mesopleuræ) covered with a close pale pubescence, a sparse hair fringe on the base of the second segment, the rest of the abdomen glabrous. Antennæ scarcely so long as the body, microscopically pilose, the joints cylindrical, the last much longer than the preceding. Head a little broader than the thorax, the pile on vertex very short, longish on the face; palpi testaceous. Thorax with the parapsidal furrows distinct throughout; the hair is longest on the scutellum and median segment. Petiole shining, projecting a little above the neck of the median segment, which is rugose; the second segment as long as the third; the apical united, and shorter than either; they bear minute scattered punctures, and are beneath more or less testaceous. Legs stout, pilose, the coxæ bearing long white hair; the hind tarsi not much longer than the tibiæ, fuscous or blackish. Wings hyaline, sub-hyaline, or slightly smoky; the nervures testaceous at the base of the wing, fuscous on the rest; the spurious nervures distinct; the areolet complete, obliquely triangular; the cubitus reaches to the end of the wing.

The ♂ similar, but with the antennæ a little longer, their third joint deeply excavated and shorter a little in proportion to the fourth, the last joint being also a little shorter.

Length 3—4½ m.m.

The flagellum in both sexes may be only reddish at the base, or more or less throughout on the under side; the femora are sometimes marked with black, and in some specimens the legs have a yellower hue than others, and the tarsi may be almost black.

Stated by Giraud (Ann. Soc. Ent. Fr., 1877, p. 416, teste Laboulbène) to have been reared from the "insectes du *Pinus pumilio*."

Common and widely distributed.

Continental distribution: Sweden, Germany, Austria, France.

2. Amblynotus femoralis.

Pl. VIII, fig. 2.

Melanips femoralis, Cameron, Trans. Ent. Soc., 1883, p. 371.

Black; the greater part of anterior femora, the apical fourth of middle, and the tibiæ and tarsi, fulvous-testaceous; the apex of hind tibiæ and tarsi more or less fuscous. Antennæ nearly as long as the body, becoming very slightly thickened towards the apex; the third joint nearly one fourth longer than the succeeding, the others becoming gradually shorter to the penultimate, which is not half the length of the last. Parapsidal sutures narrow, becoming obsolete towards the base of the mesonotum; the puncturing on scutellum is not much stronger than on mesonotum, except on the sides, which are rugose; mesopleuræ for the greater part smooth and shining, only the extreme lower part being punctured and opaque; coxæ opaque, finely punctured, except behind, where they are smooth and shining. Abdomen not much longer than the thorax, smooth, shining; the hair fringe sparse. Legs and wings as in *opacus*.

Length 4 m.m.

From *A. opacus* the present species may be known by its darker coloured femora and lighter coloured tibiæ and tarsi, by the smaller size of the scutellar foveæ, less strongly punctured scutellum, less clearly impressed parapsidal furrows (which are, however, perfectly distinct), and less hairy thorax. *A. longitarsis* is easily distinguished from it by the equal third and fourth joints of antennæ.

Rare. Bonar Bridge, Sutherlandshire.

B. *Parapsidal furrows obsolete; the third and fourth joints of antennæ in ♀ equal in length.*

3. Amblynotus longitarsis.

Amblynotus longitarsis, Reinh., B. E. Z., iv, 224, 2; Thoms., Oef., xviii, 416, 2.

Black; the femora, tibiæ, and tarsi reddish-yellow, the base of femora and hind tarsi fuscous or blackish; wings hyaline, suffused at the base with fulvous; flagellum inclining to fuscous on the lower side. Antennæ a little shorter than the body, not much thickened towards the apex, the third and fourth joints equal, the last nearly twice the length of the penultimate. Sutures of mesonotum very indistinct, almost obsolete

beyond the base. Hind tarsi distinctly longer than the tibiæ. Radial cellule short; areola distinct; spurious nervures clearly defined.

The ♂ has the antennæ longer than the body, the third joint incised, twice the length of the fourth, the last joint about one half longer than the penultimate.

Length 4 mm.

Rare.

Continental distribution: Sweden, Germany.

Genus—SAROTHRUS.

Sarothrus, Htg., Germ. Zeit., ii, 187.
Amphithectus, Htg., l. c.
Melanips, Giraud, Verh. z.-b. Ges. Wien, x, 163 (pt.).

Thorax smooth, shining; parapsidal sutures distinct, sometimes with a deep furrow between them; scutellum rugose, ovate, bifoveate at the base. Abdomen ovate, the second segment pilose; petiole smooth, shining. Antennæ filiform in ♀, the joints towards the apex moniliform; the third joint incised in ♂. Radial cellule closed; the areolet open on lower side; cubitus obsolete. Eyes oval, bare.

The antennæ are shorter than the body in the ♀, equal to it or shorter in the ♂; the joints longer than broad, the third joint considerably longer than the fourth. The parapsidal furrows are complete, as in *canaliculatus;* or semi-complete, as in *areolatus*. Middle segment thickly haired, bicarinate. Mesopleuræ shining, the longitudinal furrow distinct. The abdomen in *canaliculatus* bulges out in the centre, and is not longer than the head and thorax united; in *areolatus* it is longish and strongly compressed. The areolet is complete or incomplete, and the spurious veins may be distinct or indistinct.

May be known from *Melanips* by the thorax not being granulated and opaque; in having the thorax shining it agrees with *Dicærea*, but that genus has the scutellum smooth, and the second abdominal segment bare.

Nothing is known about the habits of the species, which are found in meadows and frequent flowers, especially of *Umbelliferæ*. Only two European species

have been described. The genus is not known from America.

1 (2) Parapsidal furrows complete, areolet and cubitus incomplete, wings hyaline, abdomen not compressed, black.
Canaliculatus.

2 (1) Parapsidal furrows incomplete, areolet and cubitus complete, wings fuscous, abdomen strongly compressed, red.
Areolatus.

1. SAROTHRUS CANALICULATUS.

Pl. VIII, fig. 7.

Sarothrus canaliculatus, Htg., Germ. Zeit., ii, 203; Reinh., B. E. Z., 226, 1.
Melanips canaliculatus, Gir., Verh. z.-b. Ges. Wien, x, 164.

Black, shining; the knees, tibiæ, and tarsi reddish-yellow; hind tarsi fuscous; wings hyaline, nervures fuscous. Antennæ a little longer than the head and thorax united, the joints moniliform, the third about one half longer than the fourth. The pronotum in front and the lower part of mesopleuræ striolated, the former very finely punctured. Mesonotum with some fine punctures; the furrow complete, wide, and deep; there is a central furrow at the base. Scutellum rugose; median segment thickly covered with a pale pubescence. Abdomen strongly compressed, the hair fringe distinct, whitish. Areolet distinct; cubitus traced to near the apex.

The ♂ has the antennæ as long as the body, the third joint incised, for the greater part testaceous beneath, and about one half longer than the fourth.

Length 2—3·5 m.m.

The colour of the legs varies from deep to yellowish-red; sometimes the flagellum in the ♂ is testaceous on the lower side. In size it varies considerably.

Common among herbage in autumn.

Continental distribution: Germany.

2. SAROTHRUS AREOLATUS.

Pl. VIII, fig. 8.

Sarothrus areolatus, Htg., Germ. Zeit., ii, 203; Reinhard, B. E. Z., iv, 227, Tab. iv, fig. 5, ♀; Thoms., Oef., xviii, 417.
Amphithectus Dahlbomi, Htg., l. c.; Giraud, Verh. z.-b. Ges. Wien, x, 175.
Melanips fumipennis, Giraud, l. c., 165.

Black, semi-shining, covered with a close fuscous pubescence on the head and thorax; the femora, except broadly at the base, the tibiæ and tarsi, and the abdomen, except more or less above and beneath (where the colour is fuscous or blackish), reddish; wings suffused with fuscous, iridescent, the nervures fuscous-black; the spurious nervures distinct. Head and thorax sparsely and minutely punctured. Antennæ shorter than the body, black, almost bare, obscurely microscopically striolated. Parapsidal furrows obsolete except at the base. Scutellum rugose. Middle segment semi-perpendicular, densely covered with pale fuscous pubescence. Abdomen strongly compressed, longer than the head and thorax united, the base rather densely pilose. ♀.

The ♂ has the antennæ a little shorter than the body, the third joint sinuated; the abdomen is reddish at the base; the femora are blackish-red at the apex, and the hind tibiæ are, moreover, less fuscous.

Length 4·5 ♀; 3—3·5 ♂.

May be known from *canaliculatus* by the parapsidal furrows being only indicated at the base of the scutellum, by the darker coloured wings, which have the spurious veins quite distinct, and by the longer and much more strongly compressed abdomen; by the body being less strongly shining and more pilose, and by the shorter antennæ in both sexes. The amount of red on the abdomen varies.

Apparently rare. Norwich (Bridgman).

Continental distribution: Sweden, Germany, Austria, Bohemia, France.

Genus—MELANIPS.

Melanips, Thoms., Oef., xviii, 417.
Dicærea, Foerster, Verh. z.-b. Ges. Wien, x, 364.
Zygosis, Foerster, l. c.

Thorax smooth, parapsidal furrows complete; scutellum flat, with two foveæ at its base, smooth, shining; base of abdomen bare. Antennæ stout, the joints in ♀ longer than broad. Radial cellule closed, elongate, the areolet situated at its base, and complete at both sides.

Characteristic of this genus is the complete areolet situate at the base of the radial cellule.

The name *Melanips* was first mentioned by F. Walker (Ent. Mag., iii, p. 161), who gave an extended description of the genus as understood by him. It is, however, quite impossible to identify the "genus" as defined by Walker, for it is clearly founded on species

which have since been relegated to distinct genera. Five years later (in 1840) Haliday himself defined it as follows (in the Appendix to Westwood's Intr. to the Mod. Class. of Ins., p. 56): Abdomen somewhat acute in ♀; petiole very short, annular; second and third segments equal; scutellum rugose, the base bifoveolate; antennæ filiform, ♂ 14, ♀ 13; cubital areolets 3. As type is given *Cynips urticæ*, Kirby, a species which has never been described. Giraud uses the word to cover *Sarothrus* and *Amblynotus* of Hartig; Thomson uses it as equivalent to *Psilogaster*, Htg., giving *Figites urticeti*, Dbm., as type; Foerster considers it identical with *Amblynotus*, Htg., with *Amb. opacus* as type, *Sarothrus* being kept distinct from it; and the *Melanips* of Thomson is renamed *Dicærea:* the Rev. T. A. Marshall apparently uses the name in the Thomsonian sense, defining it from *Amblynotus* and *Sarothrus* by the "segmentum secundum basi nudum, glaberrimum" (Ent. M. Mag., vi, p. 181).

Reinhard (B. E. Z., iv, p. 222) has pointed out that the definition, as given by Haliday, applies to *Amblynotus* as well as to *Sarothrus;* and further, that *Melanips*, Hal., was described in the same year as *Amblynotus*, and he rejects it in favour of the latter. In this I am inclined to agree with him. The question, then, is whether *Melanips* should be retained in the Thomsonian sense. Absolute certainty as to what the type of *Melanips* really was is not to be had, and, as we have seen, it is founded on several species. Haliday's definition will fit *urticeti* fairly well; it is a common species, and in some respects fits Walker's description better than does *Amblynotus*, as, *e.g.* "caput læve," thorax "fere læve;" although the additional words, "rarius scitissime et confertim punctatum obscurum," must have been founded on some other species; but the word descriptive of the abdomen, "glabrum," fits *urticeti* better than it does either *Amblynotus* or *Sarothrus*. The original description, fitting as it does at least four groups of species, it was open for the next

author to define the genus and to apply the name anew. This Giraud did by making it cover *Amblynotus* and *Sarothrus;* but the former, as we have seen, can scarcely be ousted; nor can the latter, for in any point of view it must be regarded as an offshoot from *Melanips* or *Amblynotus*. In view of the ambiguity of the description, Thomson was perfectly justified in taking his own view of the matter, and having used it for a different species from Giraud and defined it anew, I consider that *Melanips* should be used as defined by the learned Swede. There is some ambiguity about *Dicærea*. It seems to me that the same species has formed the type for *Dicærea* and *Zygosis*. Foerster quotes the same species as type; an analysis of his descriptions shows that the only distinction lies in *Zygosis* having hairy eyes; in the important points of the form and sculpture of the thorax and abdomen, and in the remarkable position of the areolet, they agree. As for the eyes, it is very difficult to see the pubescence on them; one or two of my specimens apparently show it under a strong lens, but really its absence (if it be really absent) cannot be considered of much value if there is an agreement in other points of importance, for it might readily be rubbed away.

1. Melanips urticeti.

Pl. VI, figs. 1, 1*a*.

Figites urticeti, Dbm., Onyc. Syn. tab., p. 3; No. 2, tab. ii, f. 2.
Psilogaster heteropterus, Htg., Germ. Zeits., iv, 418.
Melanips urticeti, Thoms., Oef., xviii, 417.
Figites heteropterus, Reinh., B. E. Z., iv, 235, 7.
— *nitens*, Gir., Verh. z.-b. Wien, x, 149, teste Reinhard, l. c.

Black; head and thorax covered with a fuscous pubescence; the knees, tibiæ, and tarsi fuscous-red; the tibiæ largely infuscated; wings clear hyaline, the nervures black. Antennæ a little longer than the abdomen, the flagellum inclining to fuscous; the third joint double the length of the fourth. The entire body shining, impunctate; the median

segment densely pubescent; abdomen compressed, the base of the second segment not striated.

The ♂ (teste Giraud) has the antennæ filiform, the flagellum reddish beneath, if anything longer than the body; the abdomen more pedunculated, and the legs have a clear red.

Length 2—2·5 m.m.

The ♂ I have never seen, and it has only been found by Giraud. Commonly distributed in England and Scotland.

Continental distribution: Sweden, Germany, Austria.

Genus—LONCHIDIA.

Lonchidia, Thomson, Oef., xviii, 413; Foerster, Verh. z.-b. Ges. Wien, 364.

Radial cellule open in front; cheeks not margined; pronotum with a gradual slope from the apex to the head; a fovea at the base of the scutellum. Parapsidal furrows weak in front, more distinct near the scutellum. Areolet obsolete; cubitus seldom complete. Antennæ 13-jointed in ♀, thickened towards the apex; in ♂ slender, longer than the body, the third joint incised. Body shining, the base of abdomen pilose.

A well-marked genus. It contains at present three European species,—the two known from Britain, and *L. lissonata*, Thoms., from Sweden.

Synopsis of Species.

1 (2) Wings with the greater part of the radial cellule and a spot near the apex fuscous; the apical six joints of antennæ indistinctly thickened. *Maculipennis.*

2 (1) Wings entirely hyaline, unspotted; the apical five joints of the antennæ distinctly thickened. *Clavicornis.*

1. LONCHIDIA MACULIPENNIS.

Pl. VIII, fig. 9.

Lonchidia maculipennis, Thomson, Oef., 413, 1.
Figites maculipennis, Dbm., Onych., pl. ii, fig. 1; Skand., Hym. Fauna, 13, 1.

Black; semi-shining, closely pubescent, sparsely punctured; parapsidal furrows narrow, almost complete; legs fuscous; wings hyaline, more or

less of the radial cellule and a spot before the apex fuscous; areolet and spurious nervures almost obsolete. Antennæ as long as the thorax, the third joint nearly twice the length of the fourth; the apical six joints thickened, the last considerably thicker and longer than the penultimate, ♀.

The ♂ has the antennæ longer than the body; the flagellum fuscous; the third joint sinuated; the legs fuscous, the knees, tibiæ, and tarsi lighter coloured than the base; the fuscous spot in fore wings less distinct than in the ♀.

Length 2 m.m.

Rare. Lamport (T. A. Marshall).
Continental distribution: Sweden.

2. Lonchidia clavicornis.

Pl. VIII, fig. 10.

Lonchidia clavicornis, Thoms., Oef., xviii, 413.

Black, almost shining, closely fuscous, pubescent; the legs fuscous, the knees and base of femora pale; wings hyaline, the nervures fuscous. Antennæ scarcely so long as the thorax and abdomen united; the third joint not twice the length of the fourth; the last five joints thickened, the last considerably thicker than and nearly three times the length of the penultimate. Parapsidal furrows distinct at the base, indistinct towards the apex. Costa indicated to the middle.

Length 1·5 m.m.

Differs from *maculipennis* in the wings being entirely hyaline, in the nervures being thinner, in the antennæ being longer with the apical five joints more distinctly thickened, and it is also a smaller species.

Rare. Clydesdale, London district (T. R. Billups), Worcester (J. E. Fletcher).

Sweden.

Genus—Anolytus.

Anolytus, Foerster, Verh. z.-b. Ges. Wien, xix, 365.

Cheeks not margined; mesonotum opaque, alutaceous, the parapsidal furrows scarcely indicated; no foveæ at the base of the scutellum. Antennæ 13-jointed in ♀, filiform, 14 in ♂; radial cellule elongated, the second abscissa double the length of the first, open in front; areolet and cubitus obsolete; median segment bicarinate; base of abdomen pilose; the third segment large, nearly three times the length of the second.

The non-margined cheeks and to a less extent the form of the prothorax (for the slope is not quite so gradual) allies this genus to *Lonchidia*; but it differs from it in the antennæ not being thickened towards the apex, in the opaque head and thorax, in there being no foveæ at the base of the scutellum, in the much more elongated cellule, and in the obsolete cubitus.

1. Anolytus rufipes.

Plate VII, fig. 7.

Anolytus rufipes, Foerster, l. c.
Homolaspis biusta, Cam., Trans. Ent. Soc., 1879, 112.

Black, the basal five joints of the antennæ and legs clear red, the 6—8 joints of antennæ fuscous, the base and sides of abdomen brownish-red; pleuræ suffused with red; wings hyaline, nervures fuscous. Head and thorax opaque, alutaceous, covered with a depressed microscopical pile; abdomen shining, impunctate, the apical segments faintly pilose.

Petiole double longer than wide, obliquely keeled, the base longitudinally striolated; base of second segment covered with longish white hair and one third of the length of the second; the fourth and succeeding segments visible, the fourth double the length of the fifth. Legs stout, the coxæ punctured, covered with white hair; tips of tarsi black. First abscissa of radius half the length of the second; areolet obsolete. Antennæ double the length of the thorax, filiform.

Length 2 m.m.

Rare. Probably south of England. In collection of the Rev. T. A. Marshall.

ONYCHIDES.

Second abdominal segment not half the length of the abdomen, the third much longer than the succeeding united; the second segment above produced into a tongue-shaped process; petiole short. Mesonotum with two or more furrows; scutellum bifoveated at the base. Radial cellule open in front. Antennæ filiform, the third joint sinuated in the ♂.

In the second segment not being half the length of the abdomen this group agrees with the *Figitides* and *Anacharides*; from the former it differs in the second abdominal segment being produced into a tongue-shaped process, and from the latter in the abdomen not being petiolated.

There are two other genera in Europe, namely,

Aspicera, Dbm., and *Omolaspis*, Gir. The former is readily known from either *Onychia* or *Omolaspis* by the scutellum ending in a sharp, stout, projecting spine (Pl. IV, fig. 17); *Omolaspis* does not differ materially from *Onychia*, except that the radial cellule is almost closed at the base, the subcostal nervure not being obliterated as in *Onychia*, and the petiole is less distinct.

Genus—ONYCHIA.

Onychia (Haliday), Westwood, Int., ii, Append., 56; Reinhard, B. E. Z., iv, 236.
Callaspidia, Dahlbom, Ony. och. Call., 10.
Xylaspis, Htg., Germ. Zeit., iv, 416.

Scutellum bisulcated, truncated at the apex, oblong; parapsidal furrows distinct, rugose; an acutely pointed (at the base) field between them at the base of the scutellum; radial cellule open in front and behind through the subcostal nervure not reaching to the costa; petiole shortish, not ringed; thorax rugose, opaque; antennæ filiform, the third joint slightly incised with the ♂.

The head is broader than the thorax, short, keeled down the sides; eyes large, bare, placed well up, the head projecting behind them, occiput margined. Antennæ in ♀ subfiliform; in ♂ thinner and longer, and scarcely tapering towards the apex. Thorax large, rugose; the prothorax narrow above, having a forward gradual slope towards the head. On the mesonotum there is a wide furrow at the tegulæ; the parapsidal furrows are complete, curved, rugose, wide; the field at the scutellum is crenulated. At the base of the scutellum are two large, deep, shining foveæ, separated by a sharp keel, which is continued to the apex; behind these foveæ the scutellum is depressed on either side of the keel, and with one or two transverse keels. The scutellum projects over the median segment, which is nearly perpendicular and keeled in the centre. Petiole a little longer than broad. Legs stout, longish, especially the hinder, which have the tibiæ deeply sulcated. Metatarsus nearly as long as the following joints united. Radial cellule longer

than broad; cubital cellules incomplete or absent; apex of the wings not fringed.

Onychia is found in America and India.

We find the name of *Onychia* first mentioned by Westwood in 1833 (Loud. Mag., vi, 494), but it was not defined there, and *Cynips ediogaster*, Pz., was mentioned, on Haliday's authority, as the type. In 1836 (Ent. Mag., iii, 162) it was defined by Walker thus: Antennæ mari 14-articulatæ corporis longitudine, fem. 13-articulatæ paullo breviores: thorax obscurus, scaber; scutellum sulcatum, productum, acuminatum; petiolus brevis, gracilis: abdomen læve, nitidum; segmentum primum reliqua omnino obtegens: alæ mediocres; nervi spurii fere obsoleti. As type he gives *Evania ediogaster*, Rossi. In Westwood's Introduction (ii, Ap., 56) the genus is characterised by Haliday himself as follows: Abdomen with the third segment very large, concealing all the posterior ones; petiole very short, scutellum channelled throughout; antennæ filiform, 14-jointed ♂, 13 ♀; cubital areolets three, subcostal nervure not continued to the rib.

It is now clear that Walker's *Onychia* is not the same as Haliday's, as is shown by the words "scutellum acuminatum." There is no satisfactory evidence that *Cynips ediogaster* is British. It is given as British by Curtis (Guide, p. 126); but the Rev. T. A. Marshall states (Ent. Ann., 1874, p. 120) that it was not in his collection. I cannot make out with any degree of certainty on what species Walker grounded his *Onychia;* Haliday (West., Int., App., p. 56) states that his *Onychia* had not as its type *ediogaster*, the type being a species indicated (l. c.) as *biusta*. I have not been able to trace this type; the Rev. T. A. Marshall (Ent. Ann., 1874, p. 120) says of it, "I believe I have one in bad condition; it belongs to Foerster's *Homolaspis*,"* but if so, then it disagrees with one of

* Unless there is some mistake about the specimen, this appears to be *Anolytus rufipes*. *Omolaspis* is therefore doubtfully British.

the fundamental characters given by Haliday for *Onychia*, namely, that the subcostal nervure is not continued to the rib. There is, therefore, considerable uncertainty as to what formed the type for *Onychia*, Haliday; but the statements that the scutellum was channelled throughout (there is no mention of its ending in a spine), and that the subcostal nervure did not reach to the costa, sufficiently prove that it was congeneric with *O. Westwoodi*, Dbm.

There is no evidence that *Aspicera ediogaster* is British.

1. Onychia Westwoodi.

Pl. VII, fig. 6.

Callaspidia Westwoodi, Dbm., Ony. och Call., 15, Tab. i, fig. 12.
— *de Fonscolombei*, Dbm., l. c., 13.
Xyalaspis rugosus, Htg., Germ. Zeit., iv, 417.
Callaspidia Dufouri, Giraud, Verh. z.-b. Ges. Wien, x, 160.
Onychia nigripes, Cam., Trans. Ent. Soc., 1879, 112.

Black; the apices of the basal joints of flagellum, the base of petiole, the knees (the anterior broadly), and four front tarsi, reddish, the tarsi with a testaceous tinge. Antennæ as long as the body, the apical joints a very little thicker than the basal; the first is nearly double the length of the second, the third is the longest, the fourth is a little longer than the fifth, the rest become shorter and thicker to the last, which is more globular and more truncated at the apex; the thirteenth is longer than the preceding two, being nearly as long as the third. Head shining, rugose, the sides longitudinally. Thorax opaque, rugose, the pronotum obliquely, the mesonotum transversely. The mesonotum bears five stout keels, the lateral and the central complete, the intermediate not reaching the middle; the central at the base bifurcates, forming an area about three times of the length of the base. Scutellum shining, rough, irregular; the basal keels pale testaceous. Median segment rugose, the sides covered with longish white hair. Abdomen shining. Wings hyaline, yellowish along the nervures.
Length nearly 5 mm.

Kirchner (Cat., p. 37) states that he bred four specimens from beetle larvæ, which fed on *Caltha palustris*. *Onychia notata*, Fons., was reared by Perris from *Syrphus* larvæ (Ann. Soc. Ent. Fr., 1877, p. 417).

Rare. Norwich (J. B. Bridgman).

Continental distribution: Sweden, Germany, Austria, France.

Anacharides.

Abdomen petiolate, the second abdominal segment longer than the third; scutellum bifurcate at the base, conical, triangular, prominent, sometimes spinose, never channelled; mesopleuræ usually shining; parapsidal sutures distinct, prothorax acutely margined above. Head triangular; antennæ 12-jointed ♀, 13 in ♂, as long as the body; eyes large, subrotund; frontal sutures indistinct. Hinder coxæ widely separated. Alar nervures thick; costa distinct; the areolet indicated by a thick stump of the subradial nervure.

From the *Figitina* and the *Onychina*, this group may be known by the petiolated abdomen. In addition the latter may be separated by the channelled scutellum and by the second abdominal segment being produced above into a tongue-shaped process.

Two European genera are known.

Synopsis of Genera.

1 (2) Petiole striolated, shorter than the posterior coxæ; abdomen scarcely compressed; median segment distinctly areolated. *Ægilips.*

2 (1) Petiole smooth, longer than the hind coxæ, abdomen compressed; median segment not areolated. *Anacharis.*

The name of *Anacharis*, it may be added, is discarded by Foerster on the ground that there was a plant named *Anacharis* before the word was used by Dalman; but this is an extension of the priority law which I am not prepared to sanction.

Xyalaspis is clearly founded on one of the species of *Ægilips* with spined scutellum, and *X. lævigata*, Htg., is given as the type, the chief mark of distinction given by Foerster being that the scutellum is "stark verlängert, i. einen Dorn auslaufend;" the other genera having the scutellum "more or less conical." Foerster further gives *X. lævigata* (stated by him to be identical with *nitidula*, Dal.) also as the type of *Ægilips*.

He founded likewise another genus, *Synaspis*, which differs from *Ægilips* and *Anacharis* in the scutellum

being so closely united to the mesonotum that there is no trace of amalgamation visible.

Xylaspis, Htg., is founded apparently on an *Ægilips* and partly on an *Onychia*.

Genus—ÆGILIPS.

Ægilips (Haliday), Walker, Ent. Mag., iii, 159,
Xyalaspis, Hartig, Germ. Zeit., iv, 416; Foerster, Verh. z.-b. Ges. Wien, xix, 361.

Radial cellule closed; areolet obsolete; cubitus faint; parapsidal furrows distinct; scutellum bifurcate at the base; conical, pyramidal, or spinose, smooth or more or less rugose; median segment with two keels. Abdomen petiolate, more or less ovate, not compressed, the petiole rugose, shorter than the hind coxæ.

In the ♂ the antennæ are longer than the body; the third joint cylindrical; in ♀ somewhat shorter, thickened towards the apex. The head is broader than the thorax, eyes large, bare. Thorax shining; the parapsidal furrows broad, seldom complete, often crenulated. Pronotum laterally rugose or almost impunctate. Scutellum large, margined behind, of variable form, conical or ending in a more or less elongated spine. Median segment pilose, rugose; with at least two lateral keels, and sometimes a central, but the latter is often confused. Abdomen ovate, broader behind than in front, not compressed. Petiole not much longer than broad, longitudinally rugose; second abdominal segment campanulate, not produced at the top, and forming nearly half the total length of the abdomen. Wings hyaline, the apex shortly fringed; the nervures thick; the radial cellule more or less triangular; areolet represented by a stump of the nervure; spurious nervures indistinct. Legs robust.

There is no great difference between the sexes in the form of the body, even in the abdomen; but the difference in the length and thickness of the antennæ easily separates them.

Synopsis of Species.

1 (12) Scutellum conical, not ending in a spine.
2 (5) Scutellum smooth, impunctate in front and at the sides.
3 (4) Scutellar foveæ obsolete; legs and antennæ bright yellow. *Nitidula.*
4 (3) — — distinct; legs and antennæ red. *Ruficornis.*
5 (2) Scutellum rugose.
6 (9) Mesonotum transversely striated.
7 (8) Scutellar foveæ almost obsolete, mesonotum shining; first abscissa of radius one-half the length of second; legs testaceous and yellow. *Striolata.*

8 (7) Scutellar foveæ deep; mesonotum opaque, first abscissa of radius scarcely shorter than the second; legs dull red. *Bicolorata.*

9 (6) Mesonotum not transversely rugose.

10 (11) Wings hyaline, thorax not densely pilose, petiole double longer than broad. *Rufipes.*

11 (10) Wings uniformly smooth, thorax densely pilose, petiole three times longer than broad. *Fumipennis.*

12 (1) Scutellum ending in a spine.

13 (14) Mesonotum semi-opaque, transversely striated, petiole much longer than broad (in male), foveæ at base of scutellum obsolete. *Subulifera.*

14 (13) Mesonotum not striated; scutellar foveæ large.

15 (16) Spine short, obliquely truncated at apex, not one-fourth of length of scutellum; legs fuscous, petiole shorter than broad. *Scotica.*

16 (15) Spine long, curved, more than one-third of the length of scutellum; legs and antennæ red; petiole a little longer than broad. *Armata.*

1. ÆGILIPS NITIDULA.

Pl. VI, fig. 9, ♂.

Cynips nitidula, Dal., Anal. Ent., 95.
Xylaspis lævigatus, Htg., Germ. Zeit., iv, p. 416.
Ægilips nitidula, Gir., Verh. z.-b. Ges. Wien, x, 173; Reinhard, B. E. Z., iv, 219; Thoms., Oef., xviii, 412, 4.

Black; the legs bright yellowish, the base of the coxæ, the apices of the front four tarsi, and the greater part of the hind pair, blackish. Antennæ fuscous above, testaceous beneath. Wings clear hyaline, the nervures yellowish. Shining, the parapsidal sutures distinct, crenulated; scutellum conical, shining, smooth, slightly rugose at the sides and apex, the latter depressed, the scutellar foveæ indistinct, shallow. Prothorax laterally punctured finely, longitudinally striated on the lower part of pleuræ. Petiole finely punctured, or little shorter than broad.

The ♂ similar, and with the petiole longer compared to its breadth. Length 2½ mm.

The colour of the antennæ varies, some specimens having them much darker than others. The amount of black on the coxæ and tarsi varies also.

Commonly distributed. Found often in houses.

Continental distribution: Sweden, Germany, Austria.

2. Ægilips ruficornis.

Pl. VI, fig. 8, ♀.

Ægilips ruficornis, Cam., Trans. Ent. Soc., 1883, p. 372.

Black; antennæ (except at base and apex) and legs red; coxæ black, except at apex; hind tarsi and apex of tibiæ fuscous. Antennæ, if anything, longer than the body, becoming thickened towards the apex, the third and fourth joints subequal, fifth shorter; last one half longer than penultimate. Mesonotum smooth, shining; sutures distinct, but shallow; transverse suture in front of scutellum much deeper and narrower. Scutellum smooth in front; the sides have some irregular and indistinct reticulations; behind it is rugose, but not strongly above; below reticulated, the two parts being separated by a keel; the foveæ in front are distinct, smooth; behind there is a distinct shallow fovea at either side. Median segment rugose, reticulated indistinctly in the middle. Petiole coarsely striated, broader than long. Abdomen smooth, shining, shorter than the thorax. The body is covered with a longish fuscous pubescence; on the coxæ it is white. Wings hyaline, nervures testaceous. Pronotum and episternum obscurely punctured.
Length 4 mm.

The smooth scutellum allies this species to *Æ. nitidula;* but it is a stouter insect; the antennæ are longer, the sutures on the mesonotum are scarcely crenulated; the foveæ at base of scutellum are distinct, and the antennæ and legs are red, not yellow as in *nitidula*.

Rare. Bishopton.

3. Ægilips striolata.

Pl. VI, fig. 4, ♂.

Ægilips striolata, Cam., Trans. Ent. Soc., 1883, 373.

Black; antennæ reddish-testaceous, more or less fuscous above, especially towards the apex; legs testaceous; apex of femora and tibiæ yellow; posterior tarsi and apex of tibiæ fuscous. Antennæ longer than the body; the third joint distinctly longer than the fourth; fourth and fifth subequal; the last joint not much longer than the preceding. Mesonotum scarcely shining; parapsidal sutures crenulated, distinct; a large shallow fovea, longer than broad in front of transverse suture at scutellum. Pronotum and mesopleuræ above finely punctured, opaque. Scutellum rugose, smooth, shining, at the base; looked at from the side it is bluntly triangular, above bluntly conical; foveæ obsolete. Median segment rugose, reticulated; bounding the centre

of the median segment are two keels which widen out in the middle; between these is a straight keel. Petiole a little longer than broad, rugose. Abdomen shining, smooth. Wings hyaline; nervures yellowish; tegulæ testaceous.

Length 3½ mm.

In general appearance this distinct species most nearly resembles *A. nitidula,* but the striated mesonotum, punctured pronotum and scutellum, separate it sufficiently from the common species; in having the pronotum punctured it agrees with *Æ. rugicollis*, Reinh. (only, I believe, a variety of *rufipes*), but the striated mesonotum, the large fovea at the apex of mesonotum, the less strongly punctured scutellum, the almost obsolete scutellar foveæ, mark it out as a very different species. *A. subulifera* (which has the mesonotum transversely striated) differs in the scutellum ending in a blunt spine.

Mugdoch, near Glasgow.

4. ÆGILIPS BICOLORATA.

Pl. VI, fig. 5, ♂.

Ægilips bicolorata, Cam., Ent. M. Mag., xxiii, 194.

Black; the antennæ brownish beneath, striated, longer than the body; the legs reddish-testaceous, the coxæ blackish, claws fuscous. Wings hyaline, faintly smoky from the radial cellule. Thorax semi-opaque, the mesonotum finely transversely, the pronotum more strongly obliquely striated; mesopleuræ shining, impunctate; scutellum conical, in front rugosely reticulated, behind shining, faintly punctured; median segment rugose, three-keeled, the middle one not reaching to the top. Petiole rugose, longer than broad. Parapsidal furrows faint, narrow, shallow. Abdomen shining. Radial cellule not much longer than broad, ♂.

Length 2·5 mm.

Most nearly relating to *striolata*, Cam.; differing from it in the semi-opaque mesonotum, much narrower and shallower parapsidal furrows, by the mesonotum not having a furrow in the centre at the base, in the scutellar foveæ being much longer and deeper, in the scutellum being blunter and broader at the apex, in the

rugose median segment, in the reddish-coloured legs, and by the radial cellule being shorter.

Probably from the London district.

5. ÆGILIPS RUFIPES.

Pl. VI, fig. 7, ♀.

Anacharis rufipes, Westwood, Mag. of Nat. Hist., 1833, 494.
Ægilips Dalmani, Reinh., B. E. Z., iv, 220, 3; Thoms., Oef., xviii, 412, 3.
— *rugicollis*, Reinh., l. c., 220, 2; pl. iv, f. 3.
— *rufipes*, Cam., Ent. M. Mag., xxiv, 209.

Black, shining; the legs and tegulæ ferruginous, the anterior with a more yellowish tinge, the coxæ black, the tips of anterior tarsi, the whole of posterior apex of hind tibiæ and sometimes the hind trochanters, blackish; wings hyaline, the nervures testaceous; the antennæ fuscous or blackish, usually testaceous or even reddish beneath, wholly or in the middle only. Parapsidal sutures distinct at base, but not very deep, towards the apex becoming indistinct, obscurely crenulated; scutellum conical, rugose, the basal foveæ distinct, deep, shining; prothorax laterally more or less punctured, almost rugose on lower side; mesonotum, especially towards the base, more or less finely striated or aciculated, in some specimens distinctly transverse striolated on the basal half. Petiole scarcely so long as broad, rugose.

The ♂ is similar, but with the petiole longer.

Length 2¼—2½ mm.

The punctuation on the thorax (especially on the pronotum and mesonotum) varies considerably in intensity. The coloration of the legs varies also, some specimens having them (especially the four anterior) clear testaceous-yellow, while others have them all dark ferruginous, suffused with fuscous.

Æ. rugicollis, Reinhard, differs from *rufipes* (as defined by Reinhard) in having the parapsidal sutures distinct and crenulated, the propleuræ rugose, and the legs fuscous-ferruginous; *rufipes* having the parapsidal furrows "parum impressis," the pleuræ "subpunctatis," and the legs ferruginous. The specimens in my collection, however, show so much variation in all these respects that I can only look upon *Æ. rugicollis* as a variety of *rufipes*.

Commonly distributed.

Continental distribution: Sweden, Germany, Austria.

6. ÆGILIPS FUMIPENNIS.

Pl. VII, fig. 1.

Anacharis fumipennis, Westwood, Mag. of Nat. Hist., 1833, 494; Cam., E. M. M., xxiv, 209.

Black; the legs testaceous; mandibles piceous-red, darker at the apex; petiole and base of abdomen piceous; flagellum of antennæ fuscous. Antennæ shorter than the body; thorax densely pilose; parapsidal furrows shallow, indistinct; scutellar foveæ indistinct; scutellum obtuse, rugose; median segment rugose, tricarinate. Petiole three times longer than broad, striolated, abdomen shining. Wings uniformly smoky, first abscissa of radius three-fourths of the length of the second; nervures fuscous.

Length 2·5 mm.

May be known from *rufipes* by the thorax being densely pilose, by the scutellum being somewhat shorter, by the longer petiole, and by the smoky wings.

I only know Westwood's specimen.

7. ÆGILIPS SUBULIFERA.

Pl. VI, fig. 6, ♂.

Ægilips subulifera, Thoms., Oef., xviii, 412, 1.

Black, semi-shining; the antennæ blackish-fuscous; the flagellum testaceous beneath; the legs testaceous or rufo-testaceous, the coxæ blackish or fuscous-black; hind tarsi and tips of the others blackish. Wings hyaline, the nervures fuscous-testaceous. Parapsidal sutures distinct, wide, crenulated; sides of prothorax longitudinally aciculated, the base of mesonotum transversely striolated; scutellum conical, rugose, ending in a stout, obtuse spine, which is also rugose; scutellar foveæ indistinct, shallow, finely striated. Median segment rugose. Petiole finely rugose, longer than broad. The antennæ are a little longer than the body.

Length 3 mm.

The ♂ only is known to me. Thomson apparently describes the female, and it appears to differ most from the ♂ in the length of the petiole. As with the other species, the coloration of the legs varies, as does likewise the punctuation of the thorax.

Rare. Strath Glass, Inverness-shire, in June.

Continental distribution: Sweden.

8. ÆGILIPS SCOTICA.

Pl. VI, fig. 3, ♂.

Ægilips scotica, Cam., Trans. Ent. Soc., 1883, p. 372.

Black; covered with a longish pale down. Antennæ reddish-brown beneath from the middle of first joint. Mouth and palpi brown; tegulæ testaceous; coxæ black, except at extreme apex; trochanters and hind femora for the most part and the anterior to a less extent, fuscous-black; the rest of legs dull testaceous, obscured with fuscous. Wings hyaline, nervures fuscous. Mesonotum almost shining, very slightly and closely punctured; furrows deep; there is a transverse furrow at the base of the scutellum; in front of this and between the two lateral furrows is a shallow pit, which is wider than long. Scutellum rugose, ending in a short, blunt, thick spine, which is obliquely truncated at the top. Median segment rugosely reticulated; in the centre are two smooth fields, the upper being the larger. Collar striated in front. Below the tegulæ on the mesopleuræ is a triangular striated part bounded by a ridge. Petiole rugose, shorter than broad. Abdomen shining, smooth, shorter than the thorax. Antennæ as long as the body, the third and fourth joints equal. ♂.

Length nearly 4 mm.

This species has the greatest resemblance to *Æ. subulifera*, Thoms., but that species has the mesonotum semi-opaque, transversely striated, and the petiole much longer than broad.

Glen Moriston. June.

9. ÆGILIPS ARMATA.

Pl. VI, fig. 2, ♀.

Ægilips armatus, Giraud, Verh. z.-b. Ges. Wien, x, 173.
— *armata*, Reinhard, B. E. Z., iv, 220, 4.

Black, shining, the legs ferruginous, the hind coxæ and tips of tarsi black; antennæ reddish, blackish at base and apex; wings hyaline, the tegulæ and nervures yellowish. Parapsidal sutures distinct, but narrowed towards the apex; crenulated; prothorax laterally punctured or finely rugose; mesonotum shining, with some scattered punctures; scutellum rugose, ending in a stout, rugose spine, obtuse at the apex and fully one-third of the length of scutellum; median segment coarsely rugose, a furrow, wide and not clearly limited, down the centre. Petiole clearly longer than broad, finely rugose. Scutellar foveæ distinct, shining, smooth, or aciculated.

In the ♂ the scutellar spine is slightly curved, and the antennæ are fuscous above.

Length $2\frac{1}{2}$—$2\frac{3}{4}$ mm.

The colour of the antennæ varies; sometimes they are fuscous above throughout; the legs vary also in colour; not infrequently the trochanters, base of femora, and knees are yellow; the femora and tibiæ have sometimes a fuscous tinge, and the hind tarsi may be entirely black. In some males the hind tarsi and the apical half of the hind tibiæ are black, the four coxæ being also black. The four front legs may be yellowish. The alar nervures vary from clear yellow to fuscous.

Reinhard (l. c., p. 221) describes a species (*Æ. spinigera*) which is very nearly related to *armata*, but differs from it in the mesonotum being transversely rugose.

This is no doubt the species on which Walker (Ent. Mag., iii, 161) formed his section ii of *Ægilips*: "Species unica Scotiæ incola," with "scutellum summo apice productum acuminatum, inde ad infimum basin retractum, ideoque angulum acutum fingens."

Clydesdale.

Genus—ANACHARIS.

Anacharis, Dal., Anal. Ent., 95; Giraud, Verh. z.-b. Ges. Wien, x, 169; Reinhard, B. E. Z., iv, 214.
Megapelmus, Htg., Germ. Zeit., ii, 186; Foerster, Verh. z.-b. Ges. Wien, xix, 361.

Radial cellule closed; parapsidal furrows more or less distinct; scutellum bifurcate at base; conical; median segment pilose, impunctate, shining, without keels. Abdomen compressed; petiole of variable length, but always longer than the hind coxæ. Antennæ filiform, thickened towards the apex in ♀; the third joint in ♂ cylindrical.

We owe to the observations of Herr Anton Handlirsch (Verh. z.-b. Ges. Wien, xxxvi, pp. 235–7) the only information we possess on the metamorphosis of *Anacharis typica* and *ensifera*. He found them to be parasitic on the Neuropteron, *Hemerobius nervosus*, Fab. The larva leaves its victim between the feet, throwing itself completely out, consuming then the remains of its host. It then increases conspicuously

in size, changing also colour, becoming more grey, through the contents of the food canal. It now remains motionless two days, thrusts the apex of the abdomen through the meshes of the cocoon, and empties the intestines, including the undigested chitinous parts of the *Hemerobius*. In about five days it pupates in the cocoon; the pupa state lasts about fifteen days, the imago remains two days longer in the cocoon before leaving it finally.

The maggot-like larva has twelve body-segments, is spindle-shaped with the greatest diameter on the sixth, seventh, and eighth segments. The head is perpendicular to the long axis of the body; looked at in front it appears circular; is tolerably flat, and projects very little over the considerably wider first body-segment; on the side is a curved, weaker-coloured streak, corresponding to the place of the future compound eyes of the imago. The mandibles are almost triangular, and have a long tooth at the apex, and two short ones near each other on the inner side. The first body-segment has on the upper side two rounded protuberances; the second to ninth segments have on the back two fleshy conically-pointed teeth, a peculiarity found in no other hymenopterous larva. The tenth, eleventh, and twelfth are unarmed, posteriorly reduced in size; the last has a reniform anus. The stigmas are in segments two to ten. See Pl. XIV, fig. 15.

The larvæ are transparent and white, except the mandibles, the streak on the head, and the stigmas.

The pupa has the form of the imago, except that the petiole is not extended, but is directed backwards and situated close to the hinder coxæ. The legs, wings, and antennæ are placed along the body as usual.

Synopsis of Species.

1 (4) Scutellum rugose.
2 (3) Legs clear yellow, petiole one half longer than the second segment. *Typica.*
3 (2) Legs reddish, more or less fuscous or black; petiole not longer than the second segment. *Immunis.*

4 (1) Scutellum impunctate.
5 (6) Legs clear yellow; petiole equal in length to the second segment. *Eucharoides.*
6 (5) Legs dull red, more or less black; petiole shorter than the second segment. *Ensifera.*

A. *Petiole longer than the hind coxæ, and at least equal in length to the second segment.*

To this section is to be referred

1. Anacharis tincta, *Walker.*

Ent. Mag., ii, 520.

As this species (if it be really distinct from *typica*) is unknown to me, and as it is also not described by Reinhard, Giraud, and Thomson, I give Walker's description in full.

Ana. tinctus. Mas. et fem. *Petiolo abdominis circiter longitudine, pedibus fulvis aut flavis, alis minimè fulvo tinctis, nervis ferrugineis, externo piceo.*

Ater aut æneo-ater; antennæ nigræ, subtus nigro-piceæ; petiolus *mari* abdominis longitudine, *fem.* paullò brevior: pedes fulvi; coxæ nigræ; metatrochanteres piceæ; metafemora a basi ferè ad apicem ferruginea; ungues, pulvilli et metatarsi fusci. Alæ hyalinæ minimè fulvo tinctæ; squamulæ et nervi ferruginea; nervus extimus transversus crassus, piceus (Corp. long. $1\frac{3}{4}$—2 lin.; alar. $2\frac{1}{4}$—$2\frac{1}{2}$ lin.).

Var.—β. *Mas*, antennæ nigræ piceæ, subtus ferrugineæ; articuli 1^{us} et 2^{us} nigri; metafemora omniò fulva.

Var.—γ. *Fem.*, antennæ piceæ, subtus ferrugineæ; articuli 1^{us} et 2^{us} nigri.

Var.—δ. *Fem.*, antennæ fulvæ, apice fuscæ; articulus 1^{us}, niger 2^{us} piceus; pedes flavi; coxæ nigræ, tarsi apice, ungues et pulvilli fusci; metatarsi fusci, basi fulvi; alæ nervo longitudinali basi flavo.

July; near London. September; Isle of Wight; Machynlleth, North Wales.

A. typica is distinguished apparently from *tincta* by the petiole being two-thirds of the length of the abdomen.

2. Anacharis typica.

Pl. VII, fig. 2.

Anacharis typica, Walker. Ent. Mag., ii, 520; Reinhard, B. E. Z., iv, 215, pl. iv, f. 1, ♂.
Megapelmus speciformis, Htg., Germ. Zeit., ii, 202.

Black, shining, legs except the coxæ and part of trochanters yellowish fulvous. Antennæ black, fuscous beneath, median segment, head, prothorax and thorax (especially the latter) thickly covered with greyish hair; trophi more or less pale yellow. Antennæ filiform. Prothorax laterally bearing scattered punctures; parapsidal furrows wide, moderately deep, crenulated; scutellum scarcely so shining as the mesonotum, punctured median segment finely rugose. Abdomen shining, the petiole fully half the length of the remaining segments, and one half longer than the second segment. Wings clearly hyaline, the nervures fuscous. ♀ and ♂.
Length 3—3·5 mm.

Commonly distributed.
Continental distribution: Germany.

B. *Petiole shorter than hind coxæ.*

3. Anacharis eucharoides.

Pl. VII, fig. 3.

Cynips eucharoides, Dal., Acta Holm., 1818, 78; Anal. Ent., 95.
Anacharis eucharoides, Walker, Ent. Mag., ii, 521; Ste., Ill. Suppl., pl. xlvii, fig. 1; Dbm., Onchy., pl. ii, fig. 9; Gir., Verh. z.-b. Ges. Wien, x, 170; Reinh., B. E. Z., iv, 216; Thoms. Oef., xviii, 411, 1.

Black, shining, the legs except at the base clear yellow; antennæ blackish, fuscous more or less beneath; parapsidal sutures distinct, crenulated; head, prothorax covered with pale pile; median segment with a much longer and thicker hair; petiole of abdomen about one-third of the length of the remaining segments and not much longer than the second segment. Scutellum shining, impunctate. Wings clear hyaline, the nervures testaceous.
Length 3—3·5 mm.

Differs from *A. typica* in the petiole not being one-half longer than the second segment, and in the scutellum not being rugulose.

Common.

Continental distribution: Sweden, Germany, Austria, Holland.

4. Anacharis ensifera.

Pl. VII, fig. 4.

Anacharis ensifera, Walker, Ent. Mag., ii, 522; Reinh, B. E. Z., iv, 217, pl. iv. fig. 2, ♀; Thoms., Oef., xviii, 411, 3.

Black, shining; the legs, except the coxæ and trochanters, reddish-yellow or brownish-yellow, the tarsi fuscous. Sutures of mesothorax indistinct, obsolete in front. Scutellum shining, the disc smooth and shining. Median segment opaque, densely pilose, finely rugose. Petiole distinctly shorter than the second segment, and shorter than the hind coxæ.

Length 3 mm.

Differs from *A. immunis* in the scutellum being smooth and impunctate, and in the petiole being somewhat shorter, it being distinctly shorter than the second segment. As is the case with *A. immunis*, the coloration of the legs varies somewhat, especially the femora, which have frequently the reddish colour more or less obscured with fuscous. Also the abdomen may be piceous-red.

Widely distributed.

Continental distribution: Sweden, Germany.

5. Anacharis immunis.

Pl. VII, fig. 5.

Anacharis immunis, Walker, Ent. Mag., ii, 521; Reinh., B. E. Z., iv, 216, 3; Thoms., Oef., xviii, 411, 2.
Cynips petiolata, Zett., I. L., 409.
Anacharis Staegeri, Dbm., Onych., pl. ii, fig. 10.
Megapelmus rufiventris, Htg., Germ. Zeit., iii, 358.

Black, shining; the legs, except the coxæ and trochanters, reddish-yellow, the hind tarsi fuscous. Scape of antennæ black, the flagellum brownish or fuscous beneath. Sutures of mesonotum indistinct, obsolete in front. Scutellum rugose, pleuræ shining, impunctate, the sutures rugose. Median segment finely rugose, densely covered with greyish hair. Petiole of abdomen a little shorter than the second segment and about the length of the hind coxæ. Ventral surface frequently brownish.

The ♂ has the antennæ a little longer, and has the third joint sinuate.

Length 2—2·5 mm.

Not uncommon, often found indoors. Clydesdale, Worcester, Dorsetshire.

Continental distribution: Lapland, Sweden, Germany, Italy.

Sub-family EUCOELINA.

The cup-shaped fovea on the top of the flat scutellum forms an easy mark by means of which the species of this group may be recognised. In some respects the species show greater structural variation than we find in any other sub-family. The antennæ are very diversely formed, particularly in the females, more especially in the apical joints (the apical 9 to 3) being greatly enlarged and thickened; in the males they are sometimes very long and slender. The cheeks may be margined or not; the prothorax shows some variety in form, and is, in some species, sharply raised on the top. The keels on the median segment are distinct. In only a comparative few of the species are the parapsidal furrows distinct. Characteristic of the majority of the species is the fact that the base of abdomen bears a more or less thick tuft of white or griseous hair. The metapleuræ, too, are frequently densely pilose.

Not much is known about the history of the *Eucoelina*, but a few species have been reared from Dipterous pupæ; to wit, *E. nigra*, Htg.; *E. heptoma*, Htg.; *E. emarginata*, Htg., from *Musca domestica; E. spinosa*, Htg., from *Echinomyia fera*, Meigen; *E. monileata*, Htg., from *Tachina chalybeata*, Meigen; *E. tetratoma*, Htg., from a *Phasia; E. retusa*, Htg., from *Tachina tremula*, Meigen; *E. codrina*, from *Eristalis tenax* (cf. Kirchner, Cat., p. 34). Giraud (Ann. Soc. Ent. Fr., 1877, p. 416) bred *Eucoela melanoptera*, Htg., from *Agromyza abiens* and *E. minuta*, Gir., from *Scolytus rugulosus*. Westwood (Mag. Nat. Hist., viii, p. 178, fig. 17) reared his *E. rapæ* from the tumours on

the turnip formed by *Ocyptera brassicaria*. Another species (*Didectyum zigzag*, Riley) preys on *Phora aletiæ*, a parasite of the American cotton worm, *Aletia argillacea*.

The generic arrangement of the *Eucoelina* is a work of great difficulty, chiefly owing to their great structural diversity—to the difficulty of deciding whether those variations in structure are of generic or merely of specific value. Foerster has gone on the former assumption, and has created a very large number of so-called genera. I am hardly prepared to follow him in his views. Take for example the antennæ. For the *Eucoelidinæ* with incised wings (*Kledotoma*) he formed five genera on the number of joints in the antennal club—for those with 7, 6, 5, 4, and 3-jointed clubs, so that if species would be discovered with a one or a two-jointed club two additional genera would be needed; while as *K. melanopoda* has no club at all a "genus" will have to be erected for its reception. Further, the males in all these groups show no difference, the antennal form being alike in all. The line of demarcation is rendered still more perplexing by some of the species (as in the five-jointed section) having the basal joint of the club but slightly thicker than the preceding, so that they stand midway between two of the "genera," as do some species of *Pentatoma*. Precisely the same reasoning applies to *Eucoela*, where we find a complete bridging by intermediate forms of the variously-jointed antennal club—between an antenna with no club and between those with abruptly three to nine-jointed clubs. For these reasons I cannot look upon the antennæ as furnishing a reliable character of generic value. The only features afforded by the wings upon which I feel inclined to place reliance are the incision at the apex in *Kledotoma*, and in the radial cellule being closed or open. It is certain that the incision in some species is slight; but still when we find it, slight as it may be, combined with other peculiarities, some value must be placed upon it. Also the

closed or open nature of the radial cellule may be so used, although it may be said that, as in the case of some species of *Eucoela* and *Trybliographa*, we separate them, although they may agree in other respects, because they differ in this single point; that is to say, we find the same differences in the antennal structure in both groups. The presence of the parapsidal furrows is another fact which is useful in generic separation. The only feature shown by the abdomen is that a few species want the hair fringe, and as these on the whole show certain other differences, I am inclined to place some faith in its generic usefulness.

There is no doubt that Foerster has logically carried out the views of the analytic school; but when we find that the system must lead to the creation of an unlimited number of "genera," and when further we at present know practically only the European species, and when even with the European species the system frequently fails from the number of intermediate forms, while again it only applies to one sex, one is hardly prepared to accept it as satisfactory. That, however, after all is a matter of personal opinion, upon the opinion whether synthesis or analysis is to be the guiding factor in generic creation. A translation is given of Foerster's generic synopsis, and, so far as his "genera" concern our fauna, further details are given of them.

Synopsis of Genera after Foerster.

1 (14) Base of abdomen without a hair fringe.
2 (9) Mesonotum with two distinct parapsidal furrows; antennæ without a clearly defined club.
3 (6) Parapsidal furrows strongly converging on the scutellum.
4 (5) Radial cellule open on the fore margin. **Diglyphosema.*
5 (4) Radial cellule closed on the fore margin. †*Gronotoma.*
6 (3) Parapsidal furrows almost parallel, widely separated from one another at the scutellum.
7 (8) Radial cellule open on fore margin. ‡*Disorgyma.*

* Type *D. Eupatorii*, Foer. † Type *G. sculpurata*, Foer.
‡ Type *D. divulgata*, Foer.

8 (7) Radial cellule closed on fore margin. *Microstilba.*
9 (2) Mesonotum without parapsidal furrows.
10 (11) Radial cellule open on fore margin. **Ectolyta.*
11 (10) Radial cellule closed on fore margin.
12 (13) Antennæ without a club. †*Erisphagia.*
13 (12) Antennæ with a 5-jointed club. *Cothonaspis.*
14 (1) Abdomen at the base with a hair fringe.
15 (28) Wings at the apex more or less incised or cordate.
16 (17) Radial cellule closed. ‡*Leptophilina.*
17 (16) Radial cellule open.
18 (21) Antennal club 3-jointed.
19 (20) Scutellum acuminate behind; the point, seen laterally, beak-shaped. *Rhynchacis.*
20 (19) Scutellum acuminate or rounded behind, the point not projecting into a beak. *Kleditoma.*
21 (18) Antennal club with more than three joints.
22 (23) The club 4-jointed. *Tetrarhoptra.*
23 (22) The club more than 4-jointed.
24 (25) The club 5-jointed. *Pentacrita.*
25 (24) The club more than 5-jointed.
26 (27) The club 6-jointed. *Hexacola.*
27 (26) The club 7-jointed. *Heptameris.*
28 (15) Apex of wings not incised or cordate.
29 (40) Wings shortened or incomplete.
30 (31) Antennal club 7-jointed. *Nedinoptera.*
31 (30) Antennal club with more than 7 joints.
32 (35) Metapleura clothed with thick hair.
33 (34) Radial cellule incomplete, the second abscissa of the radius absent. *Glauraspidia.*
34 (33) Radial cellule complete, the first abscissa of the radius shorter than the second. §*Apistophyza.*
35 (32) Metapleura bare, without a hair clothing.
36 (37) Wings strongly abbreviated, not reaching beyond the basis of the abdomen, and without a radial cellule. ‖*Aphyoptera.*
37 (36) Wings reaching at least to the middle of the abdomen, and with a radial cellule.
38 (39) Wings as long as the abdomen, radial cellule open in front; the first abscissa of the radius longer than the second. ¶*Aphiloptera.*
39 (38) Wings shorter than the abdomen, the radial cellule closed in front, indistinctly formed. ***Agroscopa.*
40 (29) Wings neither abbreviated nor indistinctly formed.
41 (46) Antennæ with the ♀ either 12- or 14-jointed.
42 (45) Antennæ 12-jointed.
43 (44) Radial cellule closed in front. ††*Miomœra.*
44 (43) Radial cellule open in front. ‡‡*Idiomorpha.*
45 (46) Antennæ 14-jointed. §§*Episoda.*
46 (45) Antennæ with the ♀ 13-, with the ♂ 15-jointed.

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* Type *Cothonaspis incrassata*, Thoms.
† Type *Eucoela depillis*, Gir., and *E. curta*, Gir.
‡ Type *Cothonaspis longipes*, Htg.
§ Type *Eucoela microptera*, Htg.
‖ Type *A. inustipennis*, Foer.
¶ Type *A. anisomera*, Foer.
** Type *A. helgolandica*, Foer.
†† Type *M. aberrans*, Foer.
‡‡ Type *I. melanocera*, Foer.
§§ Type *E. zanthoneura*, Foer.

47 (61) Radial cellule closed in front.
48 (49) Wings bare, and without trace of a hair fringe. *Psilodora.*
49 (48) Wings distinctly haired, and with a hair fringe.
50 (51) Abdomen laterally unusually strongly compressed, the valvula analis in the ♀ projecting, ploughshare-shaped, the borer projecting; the third joint of the antennæ in ♂ not incised, somewhat shorter than the fourth in both sexes. **Hypolethria.*
51 (50) The abdomen not unusually compressed laterally, the valvula and borer not projecting; the third antennal joint not shorter than the fourth.
52 (53) All the joints of the flagellum elongated, cylindrical; the third joint in the ♂ excessively elongated. †*Aglaotoma.*
53 (52) All the joints not elongated and cylindrical; the third joint in ♂ not excessively elongated.
54 (55) Cup of the scutellum flatly convex, not excavated nor immarginate, not closed in front. ‡*Ganaspis.*
55 (54) Cup of scutellum deepened, closed anteriorly.
56 (57) Mesonotum with two fine furrows abbreviated behind, and two very broad lateral impressions abbreviated in front. §*Chrestosema.*
57 (56) Mesonotum without median furrows and lateral impressions.
58 (59) The cup overtopping the apex of the scutellum; antennæ in ♀ without a club and very elongated in the ♂. *Psichacra.*
59 (58) The cup not overtopping the apex of the scutellum, the ♀ with a distinct club in the antennæ, in the ♂ not especially elongate.
60 (61) The first and second abscissæ of the radius almost of equal length, the club distinct, 7-jointed, the cup small, seldom large; the fourth joint of the antennæ in the ♂ longer than the third, and often unusually thickened. *Rhoptromeris.*
61 (62) The first abscissa of radius shorter than the first, the club 8- or 9-jointed, cup very large; the fourth antennal joint in ♂ shorter or equal in length to the third. *Eucoela.*
62 (61) Radial cellule open in front.
63 (64) Antennæ with strongly defined 3-jointed club. ‖*Eutrias.*
64 (47) Antennæ without or with more than three joints in the club.
65 (68) Radial cellule open at the base.
66 (67) Radial cellule at the base and apex open. ¶*Adieris.*
67 (66) Radial cellule at the apex closed. ***Piezobria.*
68 (65) Radial cellule closed at the base.
69 (70) Abdomen laterally very strongly compressed, the anal valve brought forward, cultriform. ††*Pilinothrix.*
70 (69) Abdomen laterally not unusually compressed, the anal valve hardly or not brought forward.
71 (72) Antennæ without defined club. ‡‡*Anectoclis.*
72 (71) Antennæ with a defined club.

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* Type *Eucoela melanoptera*, Htg. § Type *C. erythropa*, Foer.
† Type *Cothonaspis codrina*, Htg. ‖ Type *Eucoela tritoma*, Thoms.
‡ Type *G. mundata*, Foer. ¶ Type *A. reclusa*, Foer.
** Type *P. bicuspidata*, Foer.
†† Type *P. designata*, Foer.; *Eucoela melanoptera*, Gir.
‡‡ Type *A. indagatrix*, Foer.; *Eucoela filicornis*, Thoms.

73 (74) Club 6-jointed, the cup flat, smooth. *Hexaplasta.*
74 (73) Club more than 6-jointed, the cup striated. *Trybliographa.*

Synopsis of British Genera.

1 (2) Apex of wings incised, cordate or truncate, longly ciliated. *Kleditoma.*
2 (1) Apex of wings rounded.
3 (6) Abdomen without a hair fringe.
4 (5) Parapsidal furrows present. *Microstilba.*
5 (4) Parapsidal furrows absent. *Cothonaspis.*
6 (3) Abdomen with a hair fringe.
7 (8) Radial cellule open. *Eucoela.*
8 (7) Radial cellule closed.
9 (10) Wings entire, metapleuræ not densely woolly. *Trybliographa.*
10 (9) Wings abbreviated, metapleuræ densely woolly. *Glauraspidia.*

Genus—EUCOELA.

i. *Radial cellule closed.*

A. *Wings fringed with longish ciliæ; pilose.*

1. *Antennæ without an abrupt club.*

Antennæ without a club, and as long, longer, or not much shorter than the body, in ♂ double the length of the body. Scutellum with a large, elevated, sharply bordered cup, the apex of which projects over the rest of the scutellum, and is clearly margined; basal foveæ large, deep, separated by a sharp keel which runs from the cup of scutellum. Second abdominal segment with a hair fringe. Radial cellule closed; cubitus complete or nearly so. Legs and antennæ usually reddish. = *Psichacra*, Foerster, Verh. z.-b. Ges. Wien, xix, 386.

Except in having the antennæ longer and without a club this group does not differ from the *Eucoela* section. The projecting apex of the cup, on which Foerster lays stress, is not of any taxonomic value. The abdominal hair tuft is dense, and the median segment is frequently more or less densely pilose. *E. mandibularis*, *glottiana*, and *proxima* approach section 2 in the apical eight joints being thicker than the preceding, but still they do not form a distinct and abrupt club.

Synopsis of Species.

1 (2) Pro- and meso-thorax more or less red. *Rufula.*
2 (1) Pro- and meso-thorax entirely black.
3 (6) Median segment more or less, and keels, red and densely covered with white hairs.
4 (5) Head and thorax shining, impunctate, scutellum coarsely rugose, entirely black; radial cellule wide, the third abscissa curved. *Longicornis.*
5 (4) Head and thorax opaque, alutaceous, scutellum not rugose but striated, the sides dentate, piceous-red; radial cellule elongate, the third abscissa almost straight. *Marshalli.*
6 (3) Median segment entirely black, not densely haired.
7 (10) The antennæ and legs red.
8 (9) The antennæ distinctly longer than the body, the apical eight joints elongate, not thicker than the preceding, the venter black. *Gracilicornis.*
9 (8) The antennæ not longer than the body, the apical eight joints perceptibly thicker than the preceding, the venter broadly red. *Mandibularis.*
10 (7) The antennæ black, and femora lined with black.
11 (12) The antennæ filiform, longer than the body, the sixth joint thicker than fifth, the wings suffused with yellow. *Glottiana.*
12 (11) The antennæ shorter than the body, stout, the sixth joint not thicker than fifth, the apical seventh the thickest, wings clear hyaline. *Proxima.*

1. Eucoela rufula.

Pl. IX, fig. 3.

Eucoela rufula, Foerster, Verh. ver. Pruss. Rhein, 1855, 258.
Psichacra dalei, Cam., Trans. Ent. Soc., 1879, 115.

Antennæ a little longer than the body, red, the apical four joints fuscous; the first nearly double the length of the second, thickened and semi-truncated at the apex; the second globular, the third a little longer than the fourth, thin, slightly thickened, and fuscous at the apex; the following three joints are very little shorter and of the same form and colour; the next three are a little shorter, thicker, and rounded at the apex; the last four are thicker than the preceding, the last is thicker and longer than the twelfth, but there is scarcely a well-defined club. Head smooth, shining. Thorax smooth, shining, covered with a scattered pile, dull red, the mesonotum obscured with black in the middle, the pleuræ and sternum for the greater part black. Cup of scutellum raised, with a projecting rim, the posterior end projecting over the top like a ridge; scutellum finely rugose, the foveæ moderately deep; the rim of the cup pale. Abdomen shorter than the thorax, compressed, acute, the belly testaceous. Legs red. Wings hyaline, the nervures pale testaceous.

Length 4·5 mm.

A distinct species, easily known by the reddish pro- and meso-thorax.

Rare. Glanvilles Wootton (Dale), Worcester (Fletcher).

Continental distribution: Germany.

2. Eucoela Marshalli.

Pl. IX, fig. 2.

Psichacra Marshalli, Cam., Trans. Ent. Soc., 1883, 367.

Black; antennæ fuscous-black; legs reddish-testaceous; coxæ for the greater part black; tegulæ testaceous. Antennæ much longer than the body (nearly double the length), filiform; the third joint thickened, slightly curved, longer than the fourth. Head and thorax opaque, alutaceous. Scutellar cup small, narrow, longer than broad, acutely pointed at the base. Foveæ at the base of scutellum large; their outer border piceous and ending in an acute tooth. Median segment densely hairy. Wings hyaline, but with a slight fuscous tinge; nervures testaceous.

Length 2 mm.

The opaque alutaceous head and thorax, small narrow cup of scutellum, and thickened curved joint of antennæ easily enable this species to be separated from *longicornis* and *gracilicornis*. It is also smaller and narrower.

Barnstaple (Marshall), Box Hill (C. G. Champion).

3. Eucoela longicornis.

Pl. IX, fig. 1.

Cothonaspis longicornis, Htg., Germ. Zeit., ii, 201.
Eucoela longicornis, Giraud, Verh. z.-b. Ges. Wien, x, 138, 11.
— *gracilis*, Dahlbom, Skand. Hym. Fauna, 1846, No. 15.
— *gracilis*, Thomson, Oef., 1861, 404.

Black, shining; the antennæ, legs, tegulæ, the sides of scutellar foveæ, and more or less of the metathorax, rufo-testaceous; wings hyaline, the nervures testaceous. Antennæ nearly as long as the body, without a distinct 8-jointed club, the last eight joints of uniform thickness; the third nearly as long as the fourth. Scutellar foveæ large, deep, a little broader than long; the cup shallow, acutely pointed

at the base; the rim projecting over at the apex; the sides of scutellum rugose. Metathorax (especially the sides of the metanotum) densely covered with griseous white hair; the keels on the metanotum bulging outwardly, red. Abdominal hair-fringe dense, griseous-white; ventral surface of abdomen piceous-red. Radius continued near to the apex; apex of wings longly fringed.

The ♂ has the antennæ about two-thirds longer than the body, the third joint shorter than the fourth.

Length 2½—3 mm.

Not common. Norwich (Bridgman), Caterham (Champion).

Continental distribution: Sweden, Germany, Austria.

4. EUCOELA GRACILICORNIS.

Pl. IX, fig. 6.

Eucoela gracilicornis, Cam., Mem. Lit. Phil. Soc. Manch. (4), i, p. 9.

Black; the flagellum and legs (except the basal three-fourths of coxæ) red; the tegulæ piceous; wings yellowish-hyaline, the nervures testaceous. Antennæ filiform, longer than the body, the sixth and following joints not thicker than the fifth, elongated, much longer than broad; the third joint shorter than the fourth. Scutellum rugosely punctured; the cup orbicular, narrowed at the base; the rim piceous; the fovea at the apex large, wider than long. Hair on sides of metanotum moderately long, griseous. Abdomen not much longer than the thorax; its hair-fringe thick, griseous. Wings large; first abscissa of radius about three-fourths of the length of the second, and both are clearly curved; the third abscissa about the length of basal two united, slightly curved; cubitus reaching to the apex of the wings; apical fringe moderate.

The ♂ has the antennæ one and three-fourths longer than the body; the third joint is shorter than the fourth.

Length 4 mm.

Closely allied to *E. mandibularis*, but that has the antennæ not much longer than the body, and with the apical eight joints thicker than the preceding and scarcely twice longer than wide; the wings are clear hyaline, the nervures paler; the cubitus does not reach to the apex of the wing; the tegulæ are entirely red.

Banks of the Clyde at Cambuslang. Rare.

5. Eucoela mandibularis.

Pl. IX, fig. 5.

Figites mandibularis, Zett., I. L., 410.
Eucoela mandibularis, Thoms., Oef., 1861, 404.
♀ — *similis*, Cam., Trans. Ent. Soc., 1883, 368.
♀ — *basalis*, Htg., Germ. Zeit., ii, 201; Giraud, Verh. z.-b. Ges. Wien, ix, 138, 12.

Black, shining; the flagellum of antennæ (the scape only partly red), the legs (except the base of coxæ), reddish-testaceous to piceous-red; the tegulæ brownish or piceous; the base and ventral surface of abdomen piceous-red. Wings hyaline, with a slight smoky tinge; the nervures fuscous; the first abscissa is almost straight, forming an acute angle with the costal nervure. Antennæ scarcely so long as the thorax and abdomen united; the third and fourth joints subequal; the apical eight joints longer than broad, slightly thicker than the preceding, longish oval. Scutellum finely rugose; the apex slightly incised; the cup shallow, large, its sides fuscous; the foveæ deep, longer than broad, shining. Median segment laterally sparsely covered with long white hair; the keels black, stout. Abdominal hair-fringe narrow, griseous. Cubitus traced for three-fourths of the length of wing.

The ♂ has the antennæ more than one-half longer than the body, the third joint a little longer than the fourth and piceous towards the apex.

Length 2½—3 mm.

It is doubtful if this is *basalis*, Htg., the description being rather too laconic. It agrees fairly well with *basalis*, Giraud, but the expression that the antennæ are "as long or a little longer than the body" does not quite agree with the ♂ I have described, which has the antennæ considerably longer than the body. *E. mandibularis*, Thomson, is probably the species I have described. The abdomen may be entirely black.

Not common. Clydesdale.

Continental distribution:

I now regard *E. similis*, Cam., as a smaller and much more slender form of *mandibularis*.

6. Eucoela glottiana.

Pl. IX, fig. 7.

Psichacra glottiana, Cam., Trans. Ent. Soc., 1883, 368.

Black, shining; apex of coxæ, trochanters, base of femora and their apical half, the tibiæ and tarsi, reddish. Wings hyaline, the nervures testaceous. The antennæ are longer than the body; the third and fourth joints are much thinner than the others, the fifth thicker, the rest of nearly equal thickness; the third is distinctly longer than the fourth; the fifth shorter than the latter; the sixth nearly of the same length as the fifth; the others to the thirteenth shorter, oblong, and covered sparsely with microscopic bristle-like hairs; the basal joints of the flagellum are somewhat piceous. Scutellar cup oval, rather shallow, a round fovea at its apex; the foveæ at the base of scutellum moderately large and deep. Below the cup the scutellum is smooth and shining, lower down coarsely punctured. The hair on median segment is moderate in length and dull silvery white. Abdomen slightly aciculated on the basal half; apical half smooth and shining. Radial cellule a little longer than broad; the margin of the wing deeply fringed; the cubitus extends beyond the middle. Legs pilose.

The ♂ has the antennæ about three-fourths longer than the body, the basal joints of flagellum piceous beneath; the third joint a little longer than the fourth and thinner.

Length nearly 3½ mm.

One female and several males in Clydesdale.

7. Eucoela proxima.

Pl. IX, fig. 8.

Eucoela proxima, Cam., Mem. Lit. and Phil. Soc. Manch. (4), ii, 67.

Black, shining; the flagellum inclining to fuscous; the apex of the coxæ, trochanters, femora, tibiæ, and tarsi rufous; the base of the femora lined with black; wings clear hyaline, pubescent, ciliated; the nervures clear testaceous. Antennæ nearly as long as the thorax and abdomen united, without a club; the joints becoming very gradually and slightly thickened towards the apex; the third joint a little longer than the fourth, which is of the same length as the fifth. Scutellar foveæ longer than broad, deep, truncated at base and apex; sides of scutellum punctured; the cup depressed at the base; the apex with a shallow fovea; its apex not projecting much. Metapleuræ densely covered with fuscous hair. Abdomen a little longer than the thorax, compressed, lenticular; the hair-fringe dense, griseous. Radial cellule elongate, the second abscissa curved, fully three-fourths of the length of the third, which is nearly straight; cubitus not extending beyond the radial cellule.

Length 3 mm.

Comes nearest to *glottiana*, but stouter, has the antennæ stouter and shorter, and quite black; the scutellar foveæ are longer, and separated by a stout carina; the cup is somewhat more raised; the apex of the scutellum looked at laterally projects more and is rounded, while in *glottiana* it is truncated; the wings are clear hyaline.

Rare. Benfleet (T. R. Billups).

2. *Antennæ with a distinct eight- to nine-jointed abrupt club.*

Antennæ in ♀ with an 8 to 9-jointed club shorter than the body, 15-jointed in ♂, and not very much longer than the body. Scutellum rugose, cup large, shallow, its apex not projecting much. Metanotum fulvous or but slightly pilose. Cubitus usually present, at least at the base. Second abdominal segment with a large hair-fringe=*Eucoela*, Foerster, l. c.

Synopsis of Species.

1 (4) Cubitus complete; femora broadly red.
2 (3) Flagellum of antennæ red; length 3½ m.m. *Erythrocera.*
3 (2) Antennæ black or piceous-black, length 2½ m.m. *Cubitalis.*
4 (1) Cubitus obsolete; femora entirely black.
5 (6) Flagellum piceous; the third joint one-fourth longer than the fourth; the club distinct; radial cellule elongate, twice longer than broad; the nervures testaceous. *Ciliaris.*
6 (7) Flagellum black; the third and fourth joints subequal, the club indistinct; radial cellule blunt, broad, about one-fourth longer than wide, the nervures fuscous. *Scotica.*

(1) *Cubitus complete.*

8. EUCOELA ERYTHROCERA.

Pl. IX, fig. 10.

? *Eucoela erythrocera*, Thoms., Opus. Ent., 819.

Black; the flagellum and legs red; the coxæ for the greater part black; wings hyaline, tinged with smoky, the nervures testaceous. Antennæ as long as the abdomen, with an abrupt 8-jointed club; the third joint more than double longer than broad, about one-fourth longer than the succeeding, which is almost of the length of the fifth; the third

to fifth becoming thickened gradually towards the apex; sixth joint double longer than broad, thickened towards the apex, and thicker than the fifth; seventh to twelfth scarcely one-half longer than broad; the last double the length of twelfth. Scutellum rugosely punctured; the cup scarcely depressed, a roundish fovea at its apex; the edges bearing a few shallow punctures; the depression at the base large, deep, marked with some transverse stout striations. Metapleuræ densely covered with griseous hair; metanotum punctured. Abdomen a little longer than the head and thorax united; the hair-fringe dense, griseous. Cubitus complete; radial cellule large, double longer than it is broad at its widest part; first abscissa of radial nervure curved, about one-fourth shorter than the second.

Length 5 mm.

Thomson's *E. erythrocera* may be different, as he gives the antennæ as being entirely red. As Thomson compares it to *E. albipennis* it would appear as if *erythrocera* might be a *Trybliographa*.

Clydesdale, not rare.

9. Eucoela fortinervis.

Pl. IX, fig. 9.

Eucoela fortinervis, Cam., Mem. Lit. and Phil. Soc. Manch. (4), ii, 66.

Black; trochanters, base and apex of femora, tibiæ, and tarsi, red; hinder tarsi inclining to fuscous; wings hyaline with a decided fuscous tinge; the nervures dark fuscous; spurious nervures and cubitus stout, testaceous. Antennæ one-half longer than the body, the third joint a little longer than the fourth and thinner than it. Prothorax dilated in front, rather densely covered with fuscous hair. Scutellum coarsely rugosely punctured; the cup twice longer than broad, the base and apex depressed, narrowed and rather sharply pointed at the base, the apex rounded, pitted along the sides; the apical fovea round, deep. Scutellar foveæ wide, deep, extending backwards nearly to the middle of the cup, not completely separated in the middle. Metapleuræ densely pubescent; the metapleural keels stout, straight. Abdomen shorter than the thorax; the hair-fringe dense, griseous. Legs densely pilose. Radial cellule twice longer than wide; the first abscissa about one-fourth shorter than the second, which is straight and nearly half the length of the third; the latter is curved near the apex; cubitus thick, extending to the apex. ♂.

Length 3½ mm.

Gloucester.

10. Eucoela cubitalis.

Pl. XII, fig. 1.

Cothonaspis cubitalis, Htg., Germ. Zeit., iii, 356; Gir., Verh. z.-b. Ges. Wien, x, 135.

Black, shining; the flagellum brownish to piceous; the mouth testaceous, the apex of trochanters, the base and apex of femora more or less broadly, the tibiæ and tarsi, reddish-testaceous; wings hyaline, the nervures fusco-testaceous.

Antennæ a little longer than the head and thorax united; the third joint a little longer than the fourth, which is scarcely so long as the fifth; the apical eight joints (forming a distinct club) longer than broad; the last one-half longer than the penultimate. Scutellum finely rugose; the cup oblong, but acutely pointed at the base; the foveæ wider than long, moderately deep. Metanotum covered with sparse, white, moderately long hair. Abdomen as long as the head and thorax united; the hair-fringe thick, greyish. Radial cellule with the second abscissa about three-fourths of the length of the first, and about one-fourth shorter than the second; cubitus traced to near the apex of the wing.

The ♂ has the antennæ longer than the body, the fourth joint thicker than the third.

Clydesdale.
Continental distribution: Germany, Austria.

(2) *Cubitus obsolete.*

11. Eucoela ciliaris.

Pl. XII, fig. 2.

Eucoela ciliaris, Dbm., Skand. Hym. Fn., 31, 11; Giraud, Verh. z.-b. Ges. Wien, x, 141, 19; Thoms., Oef., xviii, 404, 16.

— *floralis*, Giraud, l. c., 141, 18 (*non* Thomson, which = *trichopsila*, Htg.).

Black, shining; the base and apex of femora, the tibiæ, and tarsi, reddish-testaceous; wings slightly pilose and shortly fringed, clear hyaline; nervures testaceous; flagellum piceous.

Antennæ as long as the abdomen, the third joint one-half longer than the fourth, the apical eight forming a distinct club. Scutellum finely rugose; the cup semi-orbicular; the fovea deep, wider than long. Abdomen scarcely so long as the head and thorax united; the hair-fringe griseous. Metapleuræ covered with griseous hair. First abscissa of cubitus not half the length of the second; the third is nearly as long as both united; cubitus represented by a short stump only or obsolete.

♂ antennæ one-half longer than the body; the third about one-fourth longer than the fourth, which is narrower and thicker than it, and slightly curved.

Length 2—2¼ mm.

The colour of the flagellum varies from dull testaceous to bluish-black, and the quantity of black on the femora varies. In some specimens not otherwise distinguishable from the type, unless it be that the radial cellule is somewhat longer, there is a trace of the cubitus.

Common.

Continental distribution: Sweden, Germany, Austria.

12. Eucoela scotica.

Pl. XII, fig. 3.

Eucoela scotica, Cam., Mem. Lit. Phil. Soc. Manch. (4), ii, 65.

Black; the knees, four fore tibiæ and tarsi piceous-red; the hinder tibiæ piceous-black; wings clear hyaline, but slightly pilose, the nervures fuscous. Antennæ nearly double the length of the thorax, with an 8-jointed club, not clearly separated; the third joint not very much longer than the fourth; the sixth joint longer than the seventh, double longer than wide; the other joints not much thicker than it, but shorter compared to the width. Cup of scutellum rather small; the fovea at apex round, deep, apex of cup projecting; scutellum coarsely punctured; depression at base large; cubitus indistinct, not much traced beyond the angle of radial cellule, which is short and broad; the first abscissa of radius slightly curved, one-fourth shorter than the second. Abdomen a little shorter than the head and thorax united; the hair-fringe moderate. Pubescence on the metapleuræ sparse.

The ♂ has the antennæ longer than the body; the third joint thin, more than double the length of the second, and longer than the fourth, which is thicker than the third.

Length 2—3 mm.

A larger and stouter species than *E. ciliaris*, differing from it in having the antennæ quite black, stouter, with a less clearly defined club, and with the third joint not much longer than the fourth. The radial cellule also is shorter and much broader, it being not very much longer compared to the greatest width; the second abscissa only being about one-fourth longer than the third; and the nervures are dark fuscous.

3. *Antennæ with a seven-jointed club.*

Antennæ with 7-jointed club in ♀ ; in ♂ the third joint enlarged and thickened ; radial cellule small, closed, the first and second abscissæ of radius subequal ; cubitus obsolete = *Rhoptromeris*, Foerster, Verh. z.-b. Ges. Wien, xix, 356.

The sub-genus *Heptamerus* of *Kleditoma* agrees with *Rhoptromeris* in the antennæ having a seven-jointed club, but the incised wings, the open radial cellule, with the first abscissa of radius considerably shorter than the second, readily distinguishes it from *Rhoptromeris*. *Nedinoptera* has also seven-jointed clubbed antennæ, but the wings are abbreviated.

13. EUCOELA HEPTOMA.

Pl. XI, fig. 4, ♂ ; fig. 5, ♀ .

Cothonaspis clavipes, Htg., Germ. Zeit., iv, 357.
— *heptomus*, Htg., l. c., ii, 201.
— *eucerus*, Htg., Germ. Zeit.,, ii, 357.
— *tristis*, Htg., l. c., iv, 415, 30.
Eucoela heptomus, Gir., Verh. z.-b. Ges. Wien, x, 143, 24.
— *nodosa*, Gir., l. c., 146, 32.
— *fovealis*, Thoms., Oef., 1861, 403, 10.

Black, shining ; the basal two or three joints of flagellum and legs testaceous ; the base of coxæ, a line on femora in the middle, and tips of tarsi, blackish ; wings hyaline, longly ciliated, scarcely pilose ; the nervures pale testaceous. Antennæ as long as the thorax and abdomen united ; the third joint about one-half longer than the fourth ; the apical but little longer than the penultimate. Scutellum finely punctured. Abdomen a little shorter than the thorax ; the hair-fringe small, white.

The ♂ has the anetnnæ longer than the body, the fourth joint fully one-half longer than the third, and considerably thickened ; the legs vary in tint, and are usually much darker coloured than in the female.

Length 1¼ mm.

A variable species as regards the coloration of the legs : in some species they are for the greater part red ; in others the red is considerably suffused with blackish.

Common. I have taken it on the top of Ben Gyrvel, Rannoch, at a height of 3000 feet.

Continental distribution: Sweden, Germany, Austria, Spain (Dr. Sharp).

B. *Wings not fringed, bare, spotted with fuscous.*

Wings bare, without a hair-fringe round the edge, and spotted with fuscous. Antennæ with an 8-jointed club, in ♂ considerably longer than the body. Scutellum with a large raised cup, of which the apex projects sharply, the basal foveæ large, deep, and separated by a stout keel. Pronotum sharply raised in the middle above the mesonotum into a sharp margin. Radial cellule short, wide = *Psilodora*, Foerster, l. c., p. 354.

A group easily recognised by the fringeless, fuscous marked wings, by their large size and raised pronotum. The legs and antennæ are for the greater part reddish.

Synopsis of Species.

1 (2) Wings only fuscous tinted below the radial cellule; cubitus obsolete a little beyond the radial cellule. *Crassinerva.*

2 (1) Wings fuscous from the basal nervure to the apex; cubitus continued to the apex of the wings. *Boienii.*

14. Eucoela Boienii.

Pl. X, fig. 3.

Cothonaspis Boienii, Htg., Germ. Zeit., ii, 200, 2.

Black, shining; the base and apex of the femora, the tibiæ and tarsi, piceous to fuscous-red; the flagellum fuscous; the wings from the basal nervure fuscous, the base hyaline. ♀ and ♂.
Length 5 mm.

Differs from *E. crassinerva* in being longer and stouter; in the apical three-fourths of the wings being fuscous tinted; in the cubitus being continued near to the apex of the wing; in the legs and flagellum being darker coloured; in the punctuation on the scutellum being stronger.

I find this species in cow-dung, probably in search of Dipterous larvæ.

Not apparently common. Clydesdale, London district.

Continental distribution: Germany.

15. Eucoela crassinerva.

Pl. X, fig. 4.

Eucoela crassinerva, Westwood, Mag. Nat. Hist, 1833, p. 494.
Figites syrphi, Newman, Ent. Mag., ii, 515.
Eucoela crassinervis, Dbm., Sk. Hym.-Fn., No. 20.
— *Guerini*, Dbm., Onych. och Callasp., pl. ii, f. 8.
Cothonaspis maculatus, Htg., Germ. Zeit., ii, 201, 3.
Eucoela maculata, Gir., Verh. z.-b. Ges. Wien, x, 134; Thoms., Oef., 1861, 405.

Black, shining; the base and apex of femora, the tibiæ and tarsi piceous-red; the flagellum piceous to piceous-red; wings hyaline, smoky in the middle, especially below the radial cellule. Antennæ a little longer than the abdomen; the club abruptly 8-jointed; the third joint one-half longer than the fourth; the fourth and fifth equal in length. Scutellum rugosely clathrate; the cup shallow, large, longer than broad; the base much more acutely pointed than the apex; the edge fuscous or piceous; the foveæ large, deep, broader than long, shining, their outer margin longitudinally striated. Hair-fringe large, griseous-white; metanotum sparsely covered with fuscous hair.

The ♂ has the antennæ about one-fourth longer than the body, and has the flagellum usually darker than in the ♀; the third joint is not much shorter than the fourth, is thinner than it, and is very slightly emarginate. The legs are darker than in the ♀.

Length 4—4·5 mm.

If this be *syrphi*, Newman, the species is a parasite on the larva of *Syrphus*.

Not uncommon in Scotland and England.

Continental distribution: Sweden, Germany, Austria.

ii. *Radial cellule open.*

Antennæ shorter than the body in ♀ with 8-jointed club. Scutellum rugosely punctured, with a large, deep, round cup, and having a large fovea behind. Second abdominal segment with a large hair-fringe. Wings deeply fringed. Cubitus complete or obsolete=*Trybliographa*, Foerster, Verh. z.-b. Ges. Wien, xix, 359.

Synopsis of Species.

1 (6) Cubitus complete or nearly so.
2 (5) Antennal flagellum reddish; legs for the greater part reddish.
3 (4) Wings smoky tinted, the third joint of antennæ fully one-half longer than the fourth, the club sub-abrupt, the sixth joint distinctly longer than the seventh, and thinner than it. *Rapæ.*
4 (3) Wings hyaline, the third joint not one-half longer than the fourth, the club abrupt; the sixth joint equal in length and thickness to the seventh. *Crassicornis.*
5 (2) Antennæ deep black; the legs for the greater part black. *Nigricornis.*
6 (1) Cubitus obsolete.
7 (8) The third joint nearly one-half longer than the fourth, the fifth equal in length to the fourth; nervures fuscous. *Diaphana.*
8 (7) The third and fourth joints sub-equal, the fifth longer than the fourth; nervures clear yellow. *Testaceipes.*

16. EUCOELA RAPÆ.

Pl. X, fig. 5 ♀, 6 ♂.

Eucoela rapæ, Westwood, Mag. Nat. Hist., viii, 178, fig. 17.
Cothonaspis scutellaris, Htg., Germ. Zeit., ii, 200; l. c., iii, 356.
Figites foveator, Dbm., Sk. Hym. Fn., 30 ?

Black, shining; the flagellum, the base of coxæ, trochanters, more or less of the femora, the tibiæ, and tarsi, piceous-red; wings hyaline, with a yellowish-smoky tinge; the nervures testaceous or fuscous. Antennæ three-fourths of the length of the body, stout, the third joint scarcely one-half longer than the fourth, the fifth a little longer than the fourth, the last eight forming a clearly defined club, the sixth joint longer than the seventh and almost thinner than it. Scutellum behind, and to a less extent laterally, strongly rugose; the cup almost oval; the foveæ large, wider than long. Abdomen lenticular, somewhat longer than the head and thorax united; the hair-fringe large, dull, griseous. First abscissa of the radius more than half the length of the second; the third nearly as long as the first and second united, curved. Cubitus complete.

The ♂ has the antennæ longer than the body; the third joint is a little longer than the fourth, and not much thinner than it.

Length 2¾—4 mm.

The colour of the flagellum varies from fuscous to bright piceous-red; usually it is much darker coloured in the ♂. The amount of black on the femora varies considerably; sometimes the four anterior are without black. The wings vary also in the intensity of the

smoky tinge. In the ♂ the hind tibiæ are sometimes piceous or more or less blackish.

It is doubtful if this is *scutellaris*, Htg., although on the whole it agrees fairly well with his description as far as it goes: Niger; mandibulis fuscis; antennarum flagello, ♂ fusco-nigro, ♀ fusco-rufo; trochanteribus, geniculis, tibiis tarsique rufis, tibiis prosticis plus minus fuscis; alis hyalinis. It is possible that Hartig has mixed up two species, for the above description is supplemented in vol. iii by—neuris crassis, nigris; nervo cubitali usque ante alarum apicem conspicuo. Alæ subfumatæ pilis longioribus conferte vestitæ. Giraud's *scutellaris* is also somewhat doubtful, as he confines his description mainly to colour, the length of the antennæ and of their joints not being indicated. Thomson's *ocotoma* is evidently a different species, it differing from the species here described in the antennæ being of the length of the thorax.

Bred by Westwood from the tumours on turnips formed by *Ocyptera brassicaria*.

Commonly distributed.

17. Eucoela crassicornis.

Pl. XII, fig. 4.

Trybliographa crassicornis, Cam., Mem. Lit. Phil. Soc. Man., ii (4), 64.

Black; the flagellum and legs red; the coxæ, the trochanters above, and a line on the upper side of the femora towards the base, black; wings hyaline, the nervures dull testaceous. Antennæ fully one-half longer than the head and thorax united; the third joint one-fourth longer than the fourth, which is as long as the fifth; the 8-jointed club abrupt, the sixth joint as long as the seventh and equal in length to it; moniliform. Scutellum rugose at sides and apex; the basal foveæ deep and wide. Metapleuræ densely covered with griseous hair. Abdomen lenticular, compressed laterally, longer than the head and thorax united, piceous towards the base and apex; the hair-fringe moderately broad, brownish, griseous at the apex. The first abscissa curved, fully one-half of the length of the second, which is also curved, and three-fourths of the length of the third, which is straight; the cubitus reaches quite close to the apex of the wing.

Length 4½ mm.

May be known from *rapæ* by the shorter antennæ, which are also thicker, with the club more distinctly abrupt; the third joint not one-half longer than the fourth, the sixth not longer than the seventh, the wings shorter and clear hyaline, the abdomen longer, being longer than the head and thorax united.

Cambuslang, on the Clyde.

18. Eucoela nigricornis.

Pl. X, fig. 9.

Trybliographa nigricornis, Cam., Trans. Ent. Soc., 1883, p. 369.

Black; extreme apex of coxæ and trochanters, knees broadly, tibiæ and tarsi, testaceous; the latter two infuscated towards the apex. Antennæ not much shorter than the abdomen and thorax united; the third and fourth joints equal in length; fifth a very little shorter; sixth to twelfth moniliform, longer than broad, striated, thicker than the basal joints; last joint not much thinner, but longer than the penultimate. Thorax covered with a scattered pale pubescence; scutellum rugose, its cup almost oval; sides of median segment covered with long griseous hair. Abdomen a little longer than the head and thorax united, somewhat compressed; the hair-fringe dense, griseous. Wings hyaline, slightly yellowish at the base; cubital nervure continued to the end of the wing; tegulæ dull black. The legs are covered with longish, stiff-looking, closely-set hair of a white glistening colour.

The ♂ has the antennæ nearly one-half longer than the body; the third joint is a little shorter and thinner than the fourth, which is swollen, and is shorter than the fifth.

Length 4 mm.

Comes nearest to *E. diaphana*, but sufficiently distinguished from it by its longer and entirely black antennæ, by the third joint not being much longer than the fourth, and by the cubitus being traced.

Clydesdale, Ayrshire.

19. Eucoela diaphana.

Pl. X, fig. 7.

Cothonaspis diaphanus, Htg., Germ. Zeits., iii, 356.

Black, shining; flagellum for the most part fuscous; the trochanters, the apex of femora largely, the tibiæ and tarsi, piceous-red; wings hyaline, the nervures testaceous. Antennæ longer than the head and

thorax united; the third joint a little longer than the fourth; the fourth and fifth joints equal; the 8-jointed club not abrupt. Scutellum punctured, the cup very shallow, semi-orbicular; the foveæ moderately deep, wider than long. Abdomen not much longer than the thorax; the hair-fringe wide, dull griseous. First abscissa scarcely double the length of the second; the third is a little shorter than the first and second united.

The ♂ has the antennæ longer than the body; the third joint is a little longer than the fourth, which is thicker than it and narrower at the base.

Length nearly 2 mm.

T. albipennis, Thoms., comes near to this; but the third to fifth joints of the antennæ are said to be subequal, while in our species the third joint is distinctly longer than the fourth, and the abdominal hair-fringe can hardly be said to be "angustiori."

Not uncommon in England and Scotland.

Continental distribution: Sweden (?), Germany.

20. EUCOELA TESTACEIPES.

Pl. X, fig. 8.

Trybliographa testaceipes, Cam., Trans. Ent. Soc., 1883, p. 370.

Black; apex of coxæ, trochanters, femora (except in the middle laterally), tibiæ and tarsi, testaceous; flagellum piceous-red. Antennæ as long as the thorax and abdomen united; the third joint a little shorter than the fourth, the fifth longer than either the fourth or sixth; the sixth to twelfth moniliform, longer than broad, of nearly equal length, thirteenth longer and thicker than twelfth, the club indistinct. Thorax almost glabrous; scutellum obscurely rugosely punctured; the cup oval. Sides of median segment aciculated; almost glabrous. Abdomen a little longer than the head and thorax together, slightly compressed; the hair-fringe weak, dull white. Wings clear hyaline, nervures yellow; cubitus obsolete. Abdominal hair-fringe narrow.

Length scarcely 2 mm.

Not common. Dalry.

3. *Antennal club six-jointed* (= *Hexaplasta*).

21. Eucoela hexatoma.

Pl. XI, figs. 6, 7.

Cothonaspis hexatoma, Htg., Germ. Zeit., iii, 357.

Black, shining; the flagellum fuscous-black; the legs reddish-testaceous; the coxæ and femora above and beneath towards the base, black; wings hyaline, the nervures fuscous. Pronotum and metapleuræ with distinct whitish pubescence. Antennæ longer than the abdomen; the third joint one-half longer than the fourth; the 6-jointed club not very abrupt, the last joint about one-fourth longer than the penultimate. Scutellum aciculated, the cup minute. Abdomen nearly as long as the head and thorax united; the hair-fringe dense, griseous-white. Wings longish; the first abscissa of radius a little more than half the length of the second; the third a little longer than the first and second united.

The ♂ has the antennæ much longer than the body; the third joint one-half longer than the fourth, thickened and incised, and the basal joints are more or less testaceous.

Length 1½ mm.

Rare. Clydesdale, Bonar Bridge.
Continental distribution: Germany.

Genus—Glauraspidia.

Glauraspidia, Thomson, Oef., 401; Foerster, Verh. z.-b. Ges. Wien, x, 350.
Apistophiza, Foerster, l. c., 351.

Wings abbreviated; radial cellule open. Metapleuræ and base of abdomen densely covered with woolly hair. Head triangular or oblong-triangular. Antennæ with or without a club; the third joint distinctly longer than fourth or hardly so.

The abbreviated wings and the dense mass of hair on the metapleuræ make this genus well-marked. *Apistophiza* differs from *Glauraspidia* (see Foerster) in the third antennal joint being clearly longer than the fourth, and in the radial area being distinct.

1. Glauraspidia microptera.

Pl. XIV, fig. 1.

Cothonaspis micropterus, Htg., Germ. Zeit., ii, 201, 13.
Apistophiza microptera, Foerster, Verh. z.-b. Ges. Wien, xix, 351.

Black, shining; the antennæ, legs, base and ventral surface of abdomen, rufous. Wings hyaline, pubescent, ciliated, the nervures testaceous; the basal and apical three joints of the antennæ fuscous. Antennæ a little longer than the body, filiform, without a club; the third joint fully one-half longer than the fourth. Radial cellule twice longer than broad, narrow; the second abscissa fully one-fourth longer than the third; cubitus complete. Scutellum finely rugose; the cup sharply pointed at the base; the foveæ deep, longer than broad, separated by a sharply defined keel. Abdomen as long as the thorax, compressed; the hair-fringe large, griseous. ♀.
Length 2 mm.

Hartig describes the basal two joints of the antennæ as being fuscous. In the British specimens in only one specimen is the basal joint slightly fuscous.

The species has been taken by the Rev. T. A. Marshall at Barnstaple, and by Mr. G. C. Champion at Caterham.

Continental distribution: Germany.

Genus—Cothonaspis.

Cothonaspis, Htg., Germ. Zeit., ii, 186 (pt.); Foerster, Verh. z.-b. Ges. Wien, 1878.

Second abdominal segment without a hair fringe. Antennæ 13-jointed, with 5-jointed club in ♀. Parapsidal furrows obsolete. Cup of scutellum small. Radial cellule closed; cubitus usually present. Apex of wing rounded, deeply fringed.

Pentacrita resembles *Cothonaspis* in having a five-jointed club on the antennæ; but it differs from it in having the fore-wing incised, the radial cellule open, and a hair-fringe on the second segment. *Ectolyta* and *Erisphagia* are groups which agree with it in having no hair-fringe on the second segment and no parapsidal furrows; but neither has a club on the antennæ.

The European species not yet found in Britain are *pusilla*, Giraud, *villosa*, Htg., and *gracilis*, Htg. (if the last be distinct from *pentatoma*).

1. Cothonaspis pentatoma.

Pl. XI, fig. 9.

Cothonaspis pentatoma, Htg., Germ. Zeit., ii, 201, 9; Thoms., Oef., 1861, 400, 1.
? *Cothonaspis gracilis*, Htg., Germ. Zeit., iii, 357, 26.

Black; the apex of coxæ, base and apex of femora, the tibiæ and tarsi, piceous to piceous-red, the tibiæ darker in the middle; base of abdomen bare. Antennæ with the 5-jointed club abrupt. Abdomen shorter than the thorax. Scutellum finely punctured, the cup minute. Second abscissa of radius three times the length of the third; the third nearly as long as the basal pair united. Cubitus complete.

The ♂ has the antennæ longer than the body, and the fourth joint thickened and one-half longer than the third.

Length 1½ mm.

Not common. Loch Aweside, June.
Continental distribution: Sweden, Germany.

Genus—Microstilba.

Microstilba, Foerster, Verh. z.-b. Ges. Wien, 1878, 346.

Second abdominal segment without a hair-fringe. Antennæ in ♀ 13-jointed, without a distinct club. Parapsidal furrows distinct, parallel. Scutellum blunt above, the cup large, shallow. Median segment bicarinate. Radial cellule closed; cubitus complete.

The only other British genus without a hair-fringe is *Cothonaspis*, from which *Microstilba* is readily known by the antennæ not having a five-jointed club, and by the distinct parapsidal furrows. Foerster distinguishes three other groups with parapsidal furrows, namely, *Diplyphosema* and *Gronotoma*, with the furrows strongly converging and meeting at the scutellum: the former has the radial cellule open and the latter closed; and *Disorygma*, which has the furrows parallel as in *Microstilba*, and widely apart at the scutellum, which only differs in having the radial cellule open.

1. Microstilba heterogena.

Pl. X, fig. 1, ♀.

Eucoela heterogena, Gir., Verh. z.-b. Ges. Wien, x, 137.
Cothonaspis heterogena, Thoms., Oef., 1861, 401.

Black; the anterior four knees and the anterior tibiæ testaceous; wings hyaline with a smoky tinge, the nervures black. Antennæ nearly as long as the thorax and abdomen united, the third and fourth joints sub-equal; there is no abruptly cut-off club; the joints longer than broad, the last double the length of the penultimate. Shining; the mesopleuræ and mesonotum laterally aciculated; the mesopleural furrows aciculated and bearing some transverse points. Scutellum rugose laterally and in front, its cup large, finely punctured, sub-orbicular, median segment laterally finely punctured and pubescent. Abdomen scarcely so long as the thorax, shining, bare. First abscissa of the radius about one-half longer than the second, which is curved; cubitus complete.
Length 3¼ mm.

Foerster describes a *M. bidentata* which is very nearly related to *heterogena; bistriata*, Thomson, is another species.

Rare. Milngavie, Stirlingshire, August, by sweeping among horsetails.

Continental distribution: Germany.

Genus—Kleditoma.

Kleditoma, Westwood, Lond. Mag. Nat. Hist., 1833, p. 494.
Cleditoma, Foerster, Verh. z.-b. Ges. Wien, xix, 348.
Rhynchacis, Foerster, l. c., 348.
Tetrarhoptra, Foerster, l. c., 349.
Pentacrita, Foerster, l. c., 349.
Hexacola, Foerster, l. c., 349.
Heptameris, Foerster, l. c., 350.

Wings incised, cordate, or truncate at the apex, and with a long hair-fringe, sometimes abbreviated. Radial cellule open in front, and usually at the base and apex. Cubitus obsolete. Antennæ with a 3—7-jointed club or with no clearly defined club; 13-jointed in ♀, shorter than the body; in ♂ 15-jointed, longer than the body, and with the third joint emarginate. Abdomen with a thick hair-tuft. Scutellum with the cup small; the basal foveæ large, deep, sometimes without a central keel. Head forming an oblong triangle, wide on the top.

The species are all shining black, and mostly very

small (1—2 mm. in length). The wings are usually clear hyaline; the radial nervure is usually thickened at base and apex, and seldom touches the costa.

The genus is numerous in species, and although it can be split up into many well-marked sections (chiefly by the form of the antennæ in ♀), yet the species in some of the groups are very difficult to separate. The males, moreover, do not have any distinction in the form of the antennæ, and hence they are unusually difficult to identify. The species prey on Dipterous larvæ.

In view of the great gradations exhibited by the antennæ, rendering it impossible to draw any clear line of demarcation between the differently jointed clubs, and as the males do not show any difference at all, I cannot adopt Foerster's generic definitions.

I. *Wings not abbreviated.—Species* 1—22.

A. *Scutellum at apex projecting into a more or less curved beak-shaped prolongation. Antennæ with* 3*-jointed club. The incision in the wings distinct; radial nervure straight. Scutellar cup minute; the large basal foveæ deep, and with a distinct keel* = *Rhynchacis.*

The peculiar beak form of the apex of the scutellum makes this section easy of recognition.

Synopsis of Species.

1 (2) Length 2½ mm.; radial cellule open at base; apex of scutellum forming a sharp curved beak; apical margin of wings obtusely curved. *Nigripes.*

2 (1) Length 1½—2 mm.; radial cellule closed at base; apex of scutellum forming a blunt beak; apical margin of wings sharply incised. *Nigra* and *Crassiclava.*

1. KLEDITOMA NIGRIPES.

Pl. XIII, fig. 6.

Kleditoma nigripes, Cam., Mem. Lit. and Phil. Soc. Man., i (4), 165.

Black; knees and base of tarsi piceous; wings hyaline, nervures piceous-black. Antennæ longer than the head and thorax united; the third joint attenuate at the base, twice the length of the fourth; the fourth and fifth joints narrowed at the base, longer than broad; joints 6—10 moniliform, as broad as long; joint 11 distinctly thicker than the tenth, but shorter and thinner than the eleventh, which is about one-fourth shorter than the thirteenth, the three forming a well-marked club. Occiput striated. Sides of scutellum longitudinally striated; the discal fovea small, shallow, indistinct; apex of scutellum below the cup forming a curved, hook-shaped projection. Median segment aciculate, depressed at the base. Abdomen scarcely so long as the head and thorax united; the hair-fringe thick, large, griseous. Radial cellule open at base and apex; the second abscissa of radius three-fourths of the length of third.

Length 2·3 mm.

This is the largest species of *Kleditoma* belonging to this section. It is most nearly related to *K. nigra*, but the much darker legs and wing nervures, the striated occiput, the more elongated radial cellule, which is distinctly open at base and apex, and the sharper beak-shaped apex of scutellum, sufficiently distinguish it from the smaller *nigra*.

Rare. Dulwich (T. R. Billups).

2. KLEDITOMA NIGRA.

Pl. XIII, fig. 7.

Cothonaspis niger, Htg., Germ. Zeit., ii, 201, 11.
Kleditoma nigra, Thoms., Oef., 1861, 399, 10.
Rhynchacis nigra, Foer., Verh. z.-b. Ges. Wien, xix, 349.

Black, shining; the knees, and more or less of the base and apex of the tibiæ and tarsi, testaceous or piceous; wings hyaline or subhyaline, the nervures blackish or piceous; antennæ longer than the head and thorax united, the eleventh joint shorter and thinner than the twelfth; abdominal hair-fringe griseous; dorsal apex of scutellum produced into a curved beak.

Length 1¾ mm.

Common.

Continental distribution: Sweden, Germany.

3. KLEDITOMA CRASSICLAVA.

Pl. XIII, fig. 8.

Kleditoma crassiclava, Cam., Mem. Lit. and Phil. Soc. Man., i (4), 166.

Black, shining; the knees and tarsi piceous; wings yellowish-hyaline, the nervures piceous; abdominal hair-fringe whitish. Antennæ nearly as long as the head and thorax united; the club stout, thick; its basal joint distinctly shorter and narrower than the twelfth. Apical margin of wing obtusely rounded, but very slightly incised. Apex of scutellum prolonged into a beak.

Length 2 mm.

May be known from *nigra* by being longer and stouter, by the stouter antennal club, by the blacker legs, and by the apical margin of the wings being hardly excised.

Rare. Bonar Bridge, Sutherlandshire.

B. *Scutellum not produced behind into a curved beak, rounded at apex, not broadly projecting, and retreating from the apex to the base.*

i. *Antennæ with a three-jointed club* (= *Kleditoma*).

Synopsis of Species.

1 (2) Club as long as the rest of the flagellum, the last joint fully one-half longer than the penultimate. *Marshalli.*
2 (1) Club not as long as the rest of the flagellum, the last two joints subequal.
3 (4) Scutellum projecting at apex; length over 2 mm. *Longicornis.*
4 (3) Scutellum not projecting at apex; length not over 1½ mm.
5 (8) Legs testaceous, the base piceous.
6 (7) Antennæ stout, shorter than the body; the joints of the flagellum preceding the club as broad as long; obconical. *Psiloides.*
7 (6) Antennæ as long as the body; all the joints of the flagellum twice longer than broad, elongate. *Filicornis.*
8 (5) Legs for the greater part black; radial cellule elongate.
9 (10) The joints of the antennal club closely amalgamated, not attenuate at base; pronotum striolated. *Striaticollis.*
10 (9) The joints of the antennal club not closely amalgamated, attenuate at base and apex. *Caledonica.*

4. Kleditoma Marshalli.

Pl. XIII, fig. 10.

Kleditoma Marshalli, Cam., Mem. Lit. and Phil. Soc. Manch., ii (4), 6.

Black; the legs testaceous, the coxæ and base of femora lined with black; wings clear hyaline, the nervures testaceous; the apex incised, but not deeply. Antennæ as long as the head and thorax united; the second joint subglobose, thick; the third one-half longer than the fourth; the rest broader than long; the club abrupt, the basal joint nearly as long as the three preceding joints united, and a little shorter than the second; the third joint nearly as long as the two preceding joints united, and sharply conical at the apex; the club is nearly as long as the rest of the scape united. Scutellum strongly longitudinally striolated; the cup small, acutely pointed at the base. Abdomen longer than the thorax; the hair-fringe interrupted at the top; clear white. Radial cellule elongate, narrow, more than twice longer than broad, closed at base and apex; the second abscissa of radius one-fourth shorter than the third; the apical incision broad, narrow, but distinct; the fringe long.

The ♂ has the antennæ fully one-half longer than the body; the third joint curved, not much longer than the fourth.

Length ♀ 2 mm., ♂ 1½ mm.

The great length of the club renders this (for the group) large species easily recognisable.

Barnstaple (Rev. T. A. Marshall).

5. Kleditoma longicornis.

Pl. XIII, fig. 9.

Kleditoma longicornis, Cam., Mem. Lit. and Phil. Soc. Manch., ii (4), 62.

Black; the trochanters, femora, tibiæ and tarsi, testaceous; the femora broadly lined above with black; wings hyaline, the nervures dark fuscous. Antennæ as long as the thorax and abdomen united; the basal part of the flagellum thin; the third joint not much longer than the fourth; the tenth joint longer and thicker than the ninth, and about one-fourth narrower than the eleventh; the club distinct; the joints moderately elongate, the last sharply conical at the apex and longer than the others. Scutellum laterally opaque, closely longitudinally striolate; the foveæ deep, wide, distinctly separated; the apical fovea small, shallow, circular; at the apex the scutellum broadly projects, narrowed towards the bottom, but not forming a beak as in *Rhynchacis*. Abdomen longer than the head and thorax united; the hair-fringe dense, large, griseous. Radial cellule an elongate triangle, closed at base and apex; the nervures straight, the second fully one-fourth shorter than the third; cubitus traced; apex of wing roundly incised. ♀.

Length slightly over 2 mm.

In general coloration this species comes nearest to *K. filicornis*, but the much greater size, the projecting scutellum (forming a transition to *Rhynchacis*), the longer abdomen, and the clearly indicated cubitus sufficiently separate the two.

Barnstaple (Rev. T. A. Marshall).

6. KLEDITOMA PSILOIDES.

Pl. X, fig. 2.

Kleditoma psiloides, Westwood, Mag. of Nat. Hist., 1833, 494; Cameron, E. M. M., xxiv, 208 (1888).
Eucoela bicolor, Ger., Verh. z.-b. Ges. Wien, x, 145, 34 ?
Eucoela ruficornis, Thoms., Oef., 1861, 399, 12 ?

Black; the legs reddish-testaceous, the coxæ and femora at base inclining to piceous; antennæ piceous, longer than the head and thorax united; the club abrupt, its joints nearly equal in length and thickness; wings hyaline, nervures testaceous; the radial cellule triangular; the second abscissa of radius not much longer than the first. Abdomen piceous-red at base and on ventral surface; hair-fringe large, clear, and white.
Length 1·5 mm.

The nearest described species to this is *K. geniculatus*, Htg., which differs from it in having the antennæ only the length of the thorax, and the wings have the apical margin retuse, not cordate; the legs are testaceous, with the base of femora and coxæ piceous. *K. ruficornis*, Thoms., is no doubt the same species, but Thomson describes the antennæ as red and the legs "yellow." Giraud describes the antennæ of his *K. bicolor* as being "with some individuals reddish in the middle;" the legs are described as "red."

Rare. I have only seen Westwood's type.

7. KLEDITOMA FILICORNIS.

Pl. XIV, fig. 3.

Kleditoma filicornis, Cam., Mem. Lit. Phil. Soc. Manch., 11 (4), 62.

Black; the legs pale testaceous, piceous towards the base; wings clear hyaline; the apex cordate, with a long fringe; the nervures testa-

ceous. Antennæ filiform, as long as the body; all the joints of the flagellum twice longer than broad, distinctly separated; the club subabrupt, the joints narrowed at base and apex; the apical one-fourth longer than the penultimate. Abdomen not much longer than the thorax, piceous on ventral surface; the hair-fringe large, white. Radial cellule narrow, elongate; the second abscissa of radius two-thirds the length of the third.

Length 1 mm.

May be known from *K. psiloides* by the longer and thinner antennæ, of which the joints of the flagellum are all twice longer than broad; by the thinner, less abrupt club, and by the longer and narrower radius.

Barnstaple (Rev. T. A. Marshall).

8. Kleditoma striaticollis.

Kleditoma striaticollis, Cam., Mem. Lit. Phil. Soc. Man., i (4), 167.

Black, shining; the knees broadly, trochanters and base of femora, tibiæ, and tarsi, piceous. Wings clear hyaline, the nervures testaceous. Antennæ as long as the head and thorax united; the club abrupt, its joints of equal thickness, the basal a little shorter than the second; the ninth and tenth joints are thicker than the preceding and more globular. Radial cellule elongate, the second abscissa of radius perceptibly longer than the first; apical margin of wing obtusely incised. Abdominal hair-fringe griseous, dense. Pronotum striolated. Apex of scutellum obtuse.

Length 1½ mm.

Differs from *K. brevicornis*, Thoms., in its longer antennæ (the antennæ in *brevicornis* being almost shorter than the thorax).

New Galloway, in June.

9. Kleditoma caledonica.

Kleditoma caledonica, Cam., Mem. Lit. and Phil. Soc. Man., i (4), 166.

Black, shining; the anterior four knees, tibiæ, and tarsi testaceous, the posterior and the trochanters piceous; wings hyaline, the nervures testaceous; the abdominal hair-fringe griseous. Antennæ longer than the head and thorax united; the flagellum before the club slender; the club distinct, the joints conical, distinctly attenuated at base and apex; the eleventh joint perceptibly shorter than the twelfth. Radial cellule

elongated; the second abscissa fully one-fourth longer than the first; apical margin of wings obtusely incised.
Length 1 mm.

A smaller and more slender species than *striaticollis*, and readily known from it by the joints of the club being narrowed at base and apex and clearly separated.
Cladich, Loch Awe, in June.

ii. *Antennal club four-jointed* (= *Tetratoma*).

Synopsis of Species.

1 (2) Radial cellule elongate, at least twice longer than wide; the nervures clear testaceous; antennæ longish, obscure testaceous; legs for the greater part testaceous. *Dolichocera.*
2 (1) Radial cellule triangular, not twice longer than broad; the nervures blackish or piceous; antennæ entirely, and legs for the greater part black.
3 (4) Third antennal joint at least twice the length of the fourth. *Tetratoma.*
4 (3) Third antennal joint not twice the length of the fourth.
5 (6) Length 1 mm.; antennæ filiform, the club slender, the ninth joint distinctly thicker and longer than the eighth; abdominal hair-fringe white. *Gracilicornis.*
6 (5) Length 1¾ mm.; antennæ stout, thick; the club stout; the ninth joint not distinctly longer than the eighth; abdominal hair-fringe dull griseous. *Affinis.*

10. Kleditoma dolichocera.

Pl. XIII, fig. 1.

Kleditoma dolichocera, Thoms., Opus. Ent., 817, 2.

Black, shining; apex of coxæ, trochanters, femora, tibia, and tarsi testaceous; the femora blackish in the middle; the flagellum of antennæ fuscous, darker towards the apex; wings hyaline, the nervures testaceous. Antennæ nearly as long as the body, slender; the third joint nearly twice the length of the fourth; the joints longer than broad, the ninth joint longer than the eighth, and distinctly thinner than the tenth; the club almost abruptly separated. Scutellum striolated, the fovea suboval, small. Abdomen not much longer than the thorax; the hair-fringe moderate, white. Radial cellule rather elongate, not triangular; the first abscissa of radius considerably longer than the second; apical margin but slightly incised.
Length 1½ mm.

New Galloway, in June.
Continental distribution: Sweden.

11. Kleditoma tetratoma.

Pl. XIII, fig. 4.

Kleditoma tetratoma, Thoms., Oef., 1867, 399, 8.

Black, shining; the knees, tibiæ, and tarsi piceous; wings hyaline, the nervures piceous; abdominal hair-fringe large, griseous. Antennæ longer than the head and thorax united; the club abrupt; the third joint more than twice the length of the fourth; joints four to seven dilated towards the apex, which is truncated; joints eight and nine more moniliform, the ninth a little longer and thicker than the eighth, and fully half the length of the tenth; joints ten to thirteen becoming gradually longer towards the apex. Scutellum longitudinally striolated laterally, the cup minute, its margin piceous. Abdomen with a distinct petiole, as long as the head and thorax united. Radial cellule small, the second abscissa longer than first.

Length nearly 2 mm.

Not common. Clydesdale.
Continental distribution: Sweden.

12. Kleditoma affinis.

Kleditoma affinis, Cam., Mem. Lit. and Phil. Soc. Man., ii (4), 64.

Black, shining; the trochanters, knees, and tarsi piceous; wings hyaline, the nervures dark piceous. Antennæ longer than the head and thorax united; the third joint not one-half longer than the fourth; joints four to eight dilated towards the apex, longer than broad; the apices truncated; the ninth distinctly broader than the eighth, and a little longer than it; the club abrupt, distinctly separated; the joints of nearly equal thickness and becoming gradually longer towards the apex; the tenth a little narrower than the eleventh. Radial cellule rather elongate, closed at base and apex; the second abscissa of radius distinctly longer than the first. Prothorax and median segment slightly pilose; abdominal hair-fringe dense, griseous; abdomen as long as the head and thorax united, scarcely petiolated. Scutellum laterally finely striolated.

Length 1¾ mm.

Very similar to *K. tetratoma*, Thoms., but may be easily known from it by the third antennal joint not being twice the length of the fourth, and by the shorter abdomen.

Bonar Bridge, Sutherlandshire.

13. KLEDITOMA GRACILICORNIS.

Pl. XIII, fig. 5.

Kleditoma gracilicornis, Cam., Mem. Lit. Phil. Soc. Man. (4), ii, 63.

Black, the knees and tarsi piceous; wings clear hyaline, the nervures piceous. Antennæ thin, twice the length of the thorax; the third joint one-half longer than the fourth, the fourth to seventh wider than long; the ninth oval, thicker, nearly twice longer than the sixth, and three-fourths of the width of the ninth; the club not very abrupt; the basal three joints of equal width and length, oval, the last longer and sharply conical at the apex. Radial cellule subtriangular; the second and third abscissæ of the radius subequal. Scutellum aciculate, the basal foveæ longer than wide. Abdomen longer than the head and thorax united; the hair-fringe moderate, whitish. Apical incision in wings slight. ♀.

Length 1 mm.

The much smaller size, the thinner and longer antennæ, the smaller and whiter abdominal hair-fringe sufficiently distinguish this species from *affinis*.

Nunton (Rev. T. A. Marshall).

iii. *Antennal club five-jointed or sub-five-jointed* (= *Pentacrita*).

Synopsis of Species.

1 (2) Legs clear piceous-red; antennæ piceous; length 2 mm. *Striata.*

2 (1) Legs for the greater part black; antennæ black; length under 2 mm.

3 (6) Antennæ filiform, as long as the body.

4 (5) Abdomen and legs piceous, the third antennal joint one-half longer than the fourth; the club indistinct. *Picipes.*

5 (4) Abdomen and legs black, the third joint twice the length of the fourth; the club distinct. *Elegans.*

6 (3) Antennæ stout, shorter than the body; radial cellule sub-elongate.

7 (10) The basal joint of club elongate; the antennæ thin.

8 (9) The apex of wing almost truncate; the apex of femora broadly, tibiæ and tarsi clear testaceous; the wings moderate. *Truncata.*

9 (8) The apex of wing acutely incised; the apex of femora, tibiæ, and tarsi fuscous; wings longish. *Longipennis.*

10 (7) The basal joints oval, short; the club stout; radial cellule sub-triangular. *Pentatoma.*

14. Kleditoma striata.

Pl. XIII, fig. 3.

Kleditoma striata, Cam., Fauna, 91, 6.

Black; legs testaceous, the coxæ black; trochanters piceous, femora (especially the posterior) blackish in the middle; wings hyaline, nervures piceous-black. Antennæ three-fourths of the length of the body and head together; the third joint nearly twice the length of the fourth, fourth to ninth longer than broad, transverse, not thickened towards the apex; the club not abruptly separated, its basal joint being scarcely one-half wider than the ninth, and narrower than the second, which is more ovate and shorter than the twelfth. Mesonotum semi-opaque; scutellum large, its sides strongly longitudinally striated; the cup longish ovate, its base more acutely pointed than the apex; median segment pilose, opaque, aciculate; two stout keels (diverging slightly towards the apex) run down the centre; hair-fringe on base of abdomen large, griseous.

Length 2 mm.

As regards the club, it may be said to be intermediate between *Tetratoma* and *Pentatoma*, but nearer the latter than the former. It is one of the largest species, and is easily known by the clear, bright, testaceous legs and piceous antennæ.

On the Clyde near Newton. August.

15. Kleditoma picipes.

Pl. XII, fig. 10.

Kleditoma picipes, Cam., Fauna, 92, 8 (1886).

Black; legs, base of abdomen, and flagellum piceous; wings hyaline, nervures piceous. Antennæ nearly as long as the body, becoming gradually thicker towards the apex, without any distinct club; first joint not one-half the length of the second, third not one-half the length of the fourth, tenth to twelfth equal in length and nearly in thickness; the last longer and thicker than the preceding. Thorax shining; sides of scutellum finely striated, its cup minute; median segment opaque, finely punctured; the keels nearly parallel; wings slightly but clearly emarginate at apex; radial cellule narrow, elongated, closed at base and apex; the second abscissa much longer than the first.

Length 1·5 mm.

Clydesdale.

The piceous abdomen and legs, less clearly defined

antennal club, and shorter third joint sufficiently separate *picipes* from *elegans*.

16. Kleditoma elegans.

Pl. XII, fig. 8.

Kleditoma elegans, Cam., Mem. Lit. Phil. Soc. Man., ii (4), 60.

Black; the trochanters, apex of femora, tibiæ, and tarsi, testaceous; wings hyaline, the nervures testaceous. Antennæ a little longer than the body; the third joint nearly as long as the fourth and fifth joints united, the fourth to seventh equal in length and thickness, the eighth one-half longer than the seventh and distinctly thicker than it; the 5-jointed club abrupt, the ninth joint being thicker and longer than the eighth, and the joints bear some moderately long hairs. Wings ample; the apex waved, almost truncated, but very slightly incised; radial cellule wide, moderately elongate, in length nearly twice the width of the widest part; the second abscissa of radius three-fourths longer than the first. Abdomen as long as the thorax, looked at from the side almost triangular; hair-fringe griseous.

Length nearly $1\frac{3}{4}$ mm.

Allied to *K. longipennis*, but easily known from it by the clear testaceous tibiæ and tarsi, by the incision in the wings being very much less deep, and by the eighth joint of the antennæ being clearly longer and thicker than the seventh.

Mugdock Wood, near Glasgow.

17. Kleditoma truncata.

Pl. XIII, fig. 2.

Kleditoma truncata, Cam., Mem. Lit. Phil. Soc. Man., ii (4), 60.

Black; the legs testaceous, the coxæ for the greater part black, the femora black in the middle; wings hyaline, the nervures obscure testaceous. Antennæ a little shorter than the body; the third joint twice the length of the fourth; the fourth to eighth subequal, but becoming very slightly longer, of equal width and about one-half longer than broad; the 5-jointed club subabrupt, the ninth being distinctly thinner than the tenth and shorter than it. Scutellum indistinctly striolated laterally; metapleuræ opaque, pubescent. Abdomen shorter than the thorax; the hair-fringe dense, griseous. Wings large, the apex scarcely incised (in figure the incision is too acute); the radial cellule

elongate, more than twice longer than the widest part; the second abscissa of radius twice the length of the first.
Length 1⅛ mm.

Differs from *longipennis* in the testaceous tibiæ and tarsi, in the antennæ being shorter and stouter, and the wings can scarcely be said to be incised.
Bishopton. Rare.

18. KLEDITOMA LONGIPENNIS.

Pl. XII, fig. 9.

Kleditoma longipennis, Cam., Mem. Lit. Phil. Soc. Man., ii (4), 59.

Black, shining; the knees, apex of femora, and base of tibiæ piceous; wings hyaline, the nervures piceous. Antennæ as long as the body; the third joint scarcely one-half longer than the fourth; the third to eighth thin, twice longer than broad, fully half the width of the club, which is nearly as long as the preceding six joints united; the club distinct, abrupt, its basal joint not much narrower than the second and nearly one-half shorter than it. Scutellum distinctly striated, the fovea lanceolate; sides of median segment opaque, finely punctured; its apex with a gradual slope, the keels distinct. Abdomen shorter than the thorax, compressed; the hair-fringe dense, dull griseous. Wings ample; the radial cellule elongate, its width twice the length of its widest part; the second abscissa of the radius twice the length of the first; apical margin incised, densely ciliated.
Length 1¾ mm.

Clober Wood, near Glasgow.

19. KLEDITOMA PENTATOMA.

Pl. XII, figs. 6 and 7.

Kleditoma pentatoma, Thoms., Oet., 1861, 398.
— *albipennis*, Cam., Fauna, 91.

Black, shining; apex of coxæ, trochanters, femora at base and apex, and tibiæ and tarsi, testaceous; wings hyaline, piceous. Antennæ stout, longer than the head and thorax united; the third joint twice the length of the fourth; fourth to eighth subequal, hardly dilated towards the apex; the ninth not much thicker than the eighth, and perceptibly thinner than the tenth, which is distinctly narrower than the eleventh, the 5-jointed club being thus not abrupt; joints ten to twelve subequal in length and of nearly equal thickness, the last longer. Scutellum finely striated, the fovea small. Abdomen shorter than the

thorax; the hair-fringe moderate, griseous. Radial cellule elongate, closed at base and apex, the first abscissa of radius nearly twice the length of the second.
Length 1¾ mm.

Easily known from the preceding by the much stouter antennæ, shorter radial cellule, and almost truncated apex of wings.
Clydesdale, Dumfries, Linlithgowshire.

Obs.—I formerly distinguished what I thought were two species—*pentatoma* and *albipennis*, of the *Fauna of Scotland*,—but I now think, notwithstanding some differences, that they represent only one.

iv. *Antennal club six-jointed.*

Antennæ with a 6-jointed club. Scutellum with the cup large; metapleuræ glabrous. Second abdominal segment with a large hair-fringe (= *Hexacola*, Foerster, Verh. z.-b. Ges. Wien, x, 359).

20. KLEDITOMA PICICRUX.

Pl. XI, fig. 8.

Eucoela picicrux, Giraud, Verh. z.-b. Ges. Wien, x, 143.

Black, shining, the knees and tibiæ inclining to piceous, the tarsi to fuscous; wings hyaline with a smoky tinge, the nervures black. Antennæ not much longer than the head and thorax united, stout; the third joint more than one-half longer than the fourth; the club abrupt, the last two joints subequal. Scutellum finely punctured, the cup minute. Abdomen as long as the thorax; the hair-fringe large, griseous. First abscissa of radius a mere stump, the third one-half longer than the second; cubitus completely obsolete. (In figure the wings should be incised).
Length 1½ mm.

Clydesdale, Sutherlandshire, Manual, Gloucester.
Continental distribution: Sweden.

v. *Antennal club seven-jointed* (= *Heptameris*).

21. KLEDITOMA PYGMÆA.

Pl. XII, fig. 5.

Kleditoma pygmæa, Thomson, Oef., 1861, 398.

Black, shining; the legs reddish-testaceous, the femora in the middle above and the base of coxæ black; the hind tarsi fuscous; wings hyaline, with a decided smoky tinge. Antennæ longer than the head and thorax united, the third joint one-half longer than the fourth; the 7-jointed club moderately abrupt, the last one-half longer than penultimate. Scutellum finely longitudinally striated; the cup longish oval, small, rounded at base and apex. Abdomen nearly as long as the thorax; the hair-fringe large, griseous. Wings: the radial cellule, closed at base and apex; the second abscissa of radius more than one-half the length of the first; the apical fringe longish; the incision slight. Prothorax and metathorax laterally densely haired. (In figure the wings should be incised.)

Length 2½ mm.

Rare. Scarborough (D. Sharp).
Continental distribution: Sweden.

vi. *Antennæ without a club.*

22. KLEDITOMA MELANOPODA.

Pl. X, fig. 10.

Kleditoma melanopoda, Cam., Mem. Lit. and Phil. Soc. Man., i (4), 167.

Black; the knees and fore tibiæ and tarsi piceous; wings clear hyaline, the nervures piceous. Antennæ more than twice the length of the thorax; the third joint nearly one-half longer than the fourth; the apical six joints longer and somewhat thicker than the preceding, but not forming a distinct club; the seventh joint shorter than the eighth. Occiput transversely striated; pronotum rather strongly longitudinally striated; sides of scutellum striolated; the cup lanceolate, the apical depression round, and with two small foveæ behind it; scutellar fovea large, deep, longer than broad. Abdomen compressed, longer than the head and thorax united; the hair-fringe large, griseous. Median segment with an oblique slope, shining, impunctate, the centre hollowed, the sides keeled. Wings large. ♀.

Length 2·7 mm.

There is no described species with which this species can be compared, nor can it very well be placed in any

of Foerster's "genera." The antennæ come nearest to those of *K. pygmæa*, but they have not a defined club. It is the largest species in the genus.

London district (Rev. T. A. Marshall).

II. *Wings abbreviated, shorter than the abdomen; the antennæ with a five- or seven-jointed club* (= *Nedinoptera*).

Synopsis of Species.

1 (2) Antennæ with a 7-jointed club; the wings hyaline, with black nervures; the legs blackish, piceous at the joints. *Halophila.*

2 (1) Antennæ with a 5-jointed club; the wings subhyaline, the nervures fuscous, the legs dull reddish. *Subaptera.*

23. KLEDITOMA SUBAPTERA.

Pl. XI, fig. 1, ♂.

Figites subapterus, Walker, Ent. Mag., ii, 117.
Kleditoma maritima, Thoms., Oef., 1861, 398.

Black, shining; the legs dark testaceous; wings scarcely hyaline. Antennæ longer than the head and thorax united; the third joint more than twice the length of the fourth; the fourth and fifth joints longer than broad; the sixth to eighth as broad as long; the ninth and tenth wider but narrower than the apical three, which are much thicker. Abdominal hair-fringe small.

The ♂ has the antennæ longer than the body, the third joint thickened and incised and twice the length of the fourth. The legs are darker, being almost piceous.

Length 1¾ mm.

This species lives on the rocks among seaweeds, and is said by Walker (l. c.) to run very fast, and, when touched, contracts its antennæ and legs, and lets itself fall from the rocks.

Marshall (Ent. Ann., 1874, p. 121) says, "The males, I believe, are able to fly, and frequent flowers."

Common at Torquay; Plymouth; Milford Haven (T. A. Marshall).

24. Kleditoma halophila.

Pl. XI, fig. 3.

Kleditoma halophila, Thoms., Oef., 1861, 398.

Black, shining; the apex of femora, the tibiæ and tarsi piceous; wings hyaline, the nervures black. Antennæ with the third joint double the length of the fourth; the 7-jointed club abrupt; scutellum finely longitudinally striolated. Abdomen scarcely so long as the thorax; the hair-fringe moderately dense.

The ♂ has the antennæ longer than the body; the third joint is more than double the length of the fourth, thickened, and sharply incised.

Length 1¼ mm.

The seven-jointed club separates this species from *subaptera*.

Found at Polperro, in Cornwall, by the Rev. T. A. Marshall, among decaying seaweeds.

Sub-family ALLOTRINA.

Second segment of abdomen longer than all the others united. Body smooth, shining, not punctured or striated; scutellum rounded, shining, impunctate, without any depression on the top. Antennæ 13-jointed in ♀, 14-jointed in ♂, the latter with joints 3—5 sinuated. Cubital nervure issuing from near the middle of the basal; areolet situated considerably beyond the apex of the second abscissa of the costal nervure, *i. e.* at some distance from the base of the radial cellule. Hind tibiæ with one spur.

The radial cellule may be open or closed; and it may be open also at the apex, through the radial nervure not reaching to the costa; the areolet is usually indistinct, and is seldom completely closed on the lower side. In a few species the wings are abbreviated. The antennæ in the ♀ are longer than the thorax or even longer than the body, and are usually thickened gradually towards the apex; they are much longer and thinner in the ♂, besides having the basal three joints of flagellum sinuated. The joints of scape are thicker and more ovoid than those of the flagellum. The mesonotum has sometimes the parapsidal furrows indicated to a more or less extent; there may be also a

longitudinal furrow on the mesosternum. The scutellum is separated from the mesonotum by a transverse furrow, and it may also have one or two foveæ at its base. The abdomen is sessile or subsessile, short, ovoid, not much if at all compressed, and shorter or at least not much longer than the thorax.

They are small species (from 1 to 2 mm. in length), with short ovoid bodies, seldom pilose except on the median segment and base of abdomen. So far as we know, all the species live parasitically on *Aphidæ*, or on the parasites (*Aphidius*) of aphides. It is true that Hartig records having bred several species from *Nematus gallicola;* but from my own observations I can say positively that this is an error: they really came from aphides which had crept into the galls. When an aphis has been attacked by an *Allotria* it becomes fastened to the leaf, turns brown or cream-coloured, the *Allotria* remaining inside of it until it reaches the perfect state. No cocoon is spun, the skin of the aphis serving for one. It is possible that, as suggested by Mr. G. C. Bignell, some of the species may be hyperparasites, feeding not on the aphides, but on their parasites (*Aphidius*). In that case the *Allotrina* must be regarded as injurious insects.

Undernoted is a list of the hosts of those *Allotriæ* which have been bred.

Allotria castanea, Htg., aphis on *Papaver somniferum*.
— *circumscripta*, Htg., aphis on *Raphanus;* also on *Aphis pini* on *Chærophyllum sylvestre*, and from *Aphis ribis* (Kirchner).
— *erythrothorax*, Htg., aphis on *Prunus*, and on *Aspidiotus rosæ*, Bé.
— *flavicornis*, Htg., aphis on *Cinthamus tinctorius*.
— *forticornis*, Gir., aphis on *Pinus pumilio*.

Allotria minuta, Htg., aphis on *Eryngium campestre*, and *Rumex acetosella*.
— *pusillima*, Gir., aphis on *Conium maculatum*.
— *victrix*, Westw., aphis on *Rosa canina*.
— *Tscheki*, Gir., aphis on *Ribes rubrum*.
— *longicornis*, Htg.
— *pilipennis*, Htg.
— *obscurata*, Htg.
} Out of galls of *Nematus gallicola*.
— *brachyptera*, Htg., *Pemphigus bumeliæ* on *Fraxinus* (Kaltenbach).
— *erythrocephala*, Htg., from *Aphis viciæ* and *A. ligustri* (Kirchner).
— *heterocera*, Htg., from *Aphis viciæ* and *A. plantaginis* (Kirchner).
— *longicornis*, from *Pemphigus gnaphalii*.
— *melanogaster*, Htg., from *Aphis viciæ* (Kirchner).
— *postica*, Htg., from *Aphis aparines* (Kirchner).
— *testacea*, Htg., from *Aphis chenopodii* (Kirchner).
— *circumscripta*, from aphis on fennel.
— *pedestris*, from aphis on wild carrot.

The affinities of this group are clearly nearest with the *Cyniphina*, as is shown by the length of the second abdominal segment and by the form of the radial cellule, which has the areolet nearly opposite its base. The species may, however, be easily known from the gall-makers by their smooth, shining, impunctate bodies, especially the scutellum, by the tibiæ having only one spur; by the cubitus (when present) issuing from the middle, or near the middle of the transverse basal nervure; by the incompleteness of the cubitus, so that none of the cubital cellules are closed or complete.

Generic Synopsis.

1 (2) Parapsidal furrows distinct. *Phænoglyphis.*
2 (1) Parapsidal furrows absent. *Allotria.*

Foerster adopts more "genera" than I have. The following table will explain the "genera" as adopted by this entomologist.

1 (4) Parapsidal furrows distinct.
2 (3) Parapsidal furrows complete, one or two foveæ at base of scutellum. *Phænoglyphis.*
3 (2) Parapsidal furrows incomplete, no fovea at base of scutellum. *Hemichrisis.*
4 (1) Parapsidal furrows absent.
5 (6) Wings not so long as the abdomen, without radial cellule. *Pezophycta.*
6 (5) Wings as long or longer than abdomen, and with a radial cellule.
7 (10) Radial cellule closed in front.
8 (9) Wings shortened, not or scarcely longer than abdomen. *Nephycta.*
9 (8) Wings complete, much longer than the abdomen. *Allotria.*
10 (7) Radial cellule open in front.
11 (12) Radial cellule open at the apex, owing to the radial nervure not reaching the costa. *Dylita.*
12 (11) Radial cellule closed at the apex. *Alloœysta.*

Thomson (Opusc. Ent., 811) divides *Allotria* into three sub-genera: *Auloœysta* (= *Phænoglyphis*), *Glyptoœysta* (= *Alloœysta*), and *Allotria.*

Genus—PHÆNOGLYPHIS.

Phænoglyphis, Foerster, Verh. z.-b. Ges. Wien, xix, 338.
Auloœysta, Thomson, Opusc. Ent., 811.

Mesonotum with the parapsidal furrows complete or nearly so; scutellum with one or two foveæ at the base; mesosternum with a longitudinal furrow. Radial cellule closed on fore margin; areolet complete. The third joint of antennæ in ♂ sinuated.

Foerster makes no mention of *Phænoglyphis* having a longitudinal furrow on the mesopleuræ, and I cannot make out, owing to its bad condition, if one is present in *P. xanthochroa*, but it is certainly present in *P. forticornis.* Further, he states that the radial cellule

is not twice so long as broad, which is certainly the case in our largest British species; and in it also the areolet is complete, another point in which it differs from Foerster's description.

Foerster describes a genus *Hemichrisis*, which agrees with *Phænoglyphis* in having the parapsidal furrows indicated (although not complete), while the scutellum has no foveæ at its base. He further defines it from *Phænoglyphis* in the radial cellule being "almost twice as long as broad," and the areolet is complete. The latter two points are merely specific, while no sharp line of demarcation can be drawn as to the completeness of the parapsidal furrows. Thus the only real point of distinction between them lies in, according to Foerster, *Hemichrisis* not having a fovea at the base of the scutellum. In *P. salicis* the fovea at the base of the scutellum is obscure, so that it may be said to be intermediate between *Phænoglyphis* and *Hemichrisis*.

Synopsis of Species.

1 (4) Body rufo-testaceous; second abscissa of radius twice the length of first.
2 (3) Antennæ entirely rufo-testaceous. *Xanthochroa.*
3 (2) Antennæ fuscous, testaceous at base. *Forticornis.*
4 (1) Body black; second abscissa of radius not twice the length of first. *Salicis.*

1. PHÆNOGLYPHIS XANTHOCHROA.

Pl. XV, fig. 4.

Phænoglyphis xanthochroa, Foerster, Verh. z.-b. Ges. Wien, 1869, 338.
Auloxysta rufa, Thomson, Opusc. Ent., 812.

Reddish-testaceous; the back and apex of abdomen fuscous; shining, glabrous. The antennæ longer than the body, slender, the joints elongated; parapsidal furrows deep, scarcely parallel; scutellar fovea distinct; radial cellule elongated, the second abscissa of radius more than twice the length of first; first abscissa of radius obliterated at the base; areolet obliquely triangular, open at foot; nervures obscure testaceous. Eyes black, legs paler at the base. ♂
Length 2 mm.

Neither Foerster nor Thomson states if the abdomen is to any extent marked with fuscous, as is the specimen I have described, so that it is possible it may represent another species.

Probably south of England (T. A. Marshall).

Continental distribution : Sweden, Germany.

2. Phænoglyphis forticornis.

Pl. XV, fig. 5.

Phænoglyphis forticornis, Cam., E. M. M., xxiv, 210.

Reddish-testaceous; the vertex, the top and apex of abdomen castaneous, the legs yellow, tinged with red; the antennæ fuscous, the basal five joints testaceous; wings hyaline, nervures fuscous; radial cellule elongated, narrow; the first abscissa of radius two and a half times the length of the second. Antennæ longer than the body, stout. Eyes lead-coloured.

The ♂ has the antennæ more slender, longer than the body, the third and fourth joints slightly curved.

Length 1½ mm.

Differs from *Ph. xanthochroa* in being smaller, in the antennæ being stouter and only yellowish at the base, in the vertex being broadly dark castaneous, in the radial cellule being narrower, and in the ground colour of the body being of a much more decided rufous tinge. I am not sure but that the radial cellule is open.

Rare. Barnstaple, Lastingham (T. A. Marshall).

This may be *A. testacea*, Htg., but Hartig would surely have stated if that species had parapsidal furrows if they were present.

3. Phænoglyphis salicis.

Pl. XV, fig. 6.

Allotria salicis, Cam., Trans. Ent. Soc., 1883, 367.

Black; face, pleura, and base of abdomen piceous; antennæ fuscous, the base testaceous; the posterior four coxæ, the base of four anterior femora, and the greater part of posterior, light fuscous. Wings

hyaline; radial cellule twice as long as broad; nervures pale yellow. Antennæ a little longer than the body; the second joint thick, oval, a little more than one-half longer than the third; fourth a little longer than the second; the joints become gradually thicker towards the apex. The scutellum, median segment, and base of abdomen covered with longish white pubescence, the rest of thorax and head sparsely pilose. Length 1—1½ mm.

Kilpatrick Hills, Clydesdale. Bred from a black aphis found in the galls of *Euura pentandræ* on *Salix pentandra*.

Genus—ALLOTRIA.

Allotria, Westwood, Mag. of Nat. Hist., vi, 494.
Xystus, Htg., Germ. Zeit., ii.
Nephycta, Foerster, Verh. z.-b. Ges. Wien, xix, 338.
Alloxysta, Foerster, l. c., 338 and 340.
Pezophycta, Foerster, l. c., 338 and 339.

Mesonotum and mesosternum without furrows; radial cellule closed or open, areolet usually incomplete; the third, fourth, or fifth joint of antennæ in ♂ sinuated.

Differs from the preceding genus in the thorax having no furrows. *Nephycta* agrees in every respect with *Allotria* except in having the wings abbreviated.

I. RADIAL CELLULE CLOSED (= *Allotria*, Foerster).

A. *Wings fully developed.*

(*a*) *Abdomen at apex obliquely truncated; abdominal segments not connate.*

Synopsis of Species.

1 (9) Thorax (and head) more or less red.
2 (3) Thorax entirely red; wings large, antennæ and legs entirely clear yellow. *Megaptera.*
3 (8) Thorax not entirely red, antennæ not entirely yellow.
4 (5) Pleuræ entirely, and base of abdomen broadly rufous; legs clear yellow; nervures yellow; antennæ with the apical three-fourths dark fuscous. *Pleuralis.*
5 (4) Pleuræ not entirely, and base of abdomen but slightly rufous; nervures fuscous.

6 (7) Lower part of pleuræ piceous-red; legs rufo-testaceous; radial cellule one-half longer than wide. *Ruficeps.*
7 (6) Pleuræ rufous, the centre broadly blackish, legs yellow; radial cellule large, twice longer than wide. *Ruficollis.*
8 (3) Thorax, head, and basal half of abdomen castaneous; legs testaceous; radial cellule elongate, three times longer than wide. *Collina.*
9 (1) Thorax black.
10 (15) Head red.
11 (12) Antennæ unicolorous yellow; legs clear yellow. *Flavicornis.*
12 (11) Antennæ fuscous, yellow at the base.
13 (14) Head entirely red; radial cellule elongate. *Victrix.*
14 (13) Head with the vertex castaneous; radial cellule moderate. *Tscheki.*
15 (10) Head for the greater part black (entirely or with the oral region piceous-red).
16 (19) Legs clear yellow.
17 (18) Radial cellule large, elongate, more than twice longer than wide, the femora slightly infuscated. *Circumscripta.*
18 (17) Radial cellule small, not twice longer than wide; femora clear yellow. *Minuta.*
19 (16) Legs more or less fuscous-testaceous.
20 (26) Radial cellule elongate; the second abscissa of radius at least one-half longer than the first. Head piceous-red; radial cellule wide, the basal abscissa of radius a little more than half the length of the second. *Curvicornis.*
21 (24) Head black, radial cellule elongate, basal abscissa of radius more than half the length of the apical.
22 (23) Length scarcely 1 mm.; basal joints of antennæ clear yellow. *Dolichocera.*
23 (22) Length over 1 mm.; basal joints of antennæ fuscous or black.
24 (21) Head piceous, black on top; the fourth and fifth joints of antennæ deeply curved. ♂. *Ancylocera.*
25 (26) Head black; the fourth and fifth joints of antennæ but slightly curved. *Longicornis.*
26 (25) Radial cellule minute, not much longer than wide; the apical abscissa of radius curved. *Mullensis.*

1. Allotria megaptera.

Pl. XV, fig. 7.

Allotria melanogaster, Cam., Fauna, pt. 2, p. 86, *non* Htg., Gir.

Reddish-testaceous, the face yellow, the antennæ testaceous, the legs yellow; abdomen black, the base reddish, the apex fuscous; wings large, hyaline, the nervures pallid yellow. Antennæ longer than the body, the third to fifth joints very slightly curved, the third and fourth subequal. Radial cellule moderately large, about double longer than wide; the first abscissa of radius three-fourths of the length of the second. Pubescence on median segment and base of abdomen sparse.

Wings large, considerably longer than body, nervures pallid testaceous.

Length 1¾ mm.

I first thought that this species was *A. melanogaster*, Htg. (Germ. Zeit., ii, 200), but I am now inclined to regard it as different. Hartig's description is short: Rufus; abdomine nigro, basi rufo; thoracis dorso plerisque obscurato; long ¼ lin. Giraud supplements this (Verh. z.-b. Ges. Wien, 1862, p. 129) by stating that the radial cellule is "courte et assez petite," and that the cubitus is not indicated; and he gives the length as 1 mm. for both sexes. We may therefore say that *A. megaptera* differs from *melanogaster* in the radial cellule being larger (not minute), and in the cubitus being distinctly traced to beyond the middle of the wing, and in being ¾ mm. longer.

In coloration it agrees very closely with *A. halterata*.

Rare. Cadder Wilderness, Clydesdale.

2. Allotria pleuralis.

Pl. XV, fig. 8.

Allotria pleuralis, Cam., Trans. Ent. Soc., 1879, 113.

Head pale red, the vertex slightly darker, the pronotum, mesonotum, and base of median segment black; the pleuræ, sternum, and apex of median segment dark red; abdomen black, reddish at the base above, the basal half laterally more or less dark fuscous red; legs pale yellow; wings clear hyaline, the nervures very pale testaceous; radial cellule small, scarcely longer than broad; the basal abscissa of radius not much shorter than the second. Antennæ a little shorter than the body, thickened towards the apex; the basal four or five joints pale yellow, the others black, or rather dark fuscous.

Length 1 mm.

A. longipennis, Htg., comes near to this little species, but it has the whole of the antennæ and only the pro- and meso-thorax reddish. *A. postica* differs in having only the median segment red. *A. ruficeps* has not the pleuræ entirely rufous and the abdomen entirely black, and the first abscissa of radius is longer.

Clydesdale.

3. Allotria ruficollis.

Pl. XV, fig. 10.

Allotria ruficollis, Cam., Trans. Ent. Soc., 1883, 365.

Black; antennæ and legs yellow; head, prothorax, breast, mesopleuræ at base and apex, metapleuræ and base of abdomen, red; tegulæ piceous; wings hyaline, nervures dull yellowish; radial cellule one-half longer than broad. Antennæ longer than the body, the third joint straight and a little longer than the fourth, the last a little longer than the preceding; the apical joints are somewhat fuscous. Base of abdomen pilose.
Length 1½ mm.

Closely allied to *A. pleuralis*, but that has not the mesopleuræ black, the antennæ are only yellow at the base, the radial cellule is not much longer than broad, and it is also a smaller species.

Rare. Mull, in June.

4. Allotria ruficeps.

Pl. XV, fig. 9.

Allotria ruficeps, Cam., Trans. Ent. Soc., 1883, p. 365.

Black; pronotum, mesopleuræ on lower side, and breast, piceous-red; legs reddish-yellow; joints one to four of antennæ yellow, the rest piceous; head and petiole red. Wings hyaline, nervures fuscous; radial cellule not much longer than broad; the cubitus is traced for two-thirds of the wing. Antennæ longer than the body; the third joint straight, distinctly one-fourth longer than the following; the last is not much longer than the preceding. The pubescence on median segment and base of abdomen is dense. ♀.
Length 1½ mm.

The radial cellule is shorter than in *A. flavicornis*, and the shortness of it easily distinguishes it from *A. ruficollis*, with which it has some resemblance in coloration. It is longer than *A. pleuralis*, the antennæ are somewhat longer, and have the third joint longer in proportion to the fourth, and the cubital nervure is indicated, which is not the case in *pleuralis*.

New Galloway, in June. Rare.

5. Allotria flavicornis.

Pl. XVI, fig. 1.

Xystus flavicornis, Htg., Germ. Zeit., iii, 352.
Allotria flavicornis, Gir., Verh. z.-b. Ges. Wien, x, 129.

Black; the head red, darker (sometimes fuscous or even blackish) on vertex; antennæ and legs yellow; wings hyaline, nervures testaceous, the apex shortly fringed; pubescence on median segment sparse, and still more so on the base of abdomen. Antennæ longer than the body, joints three to five in ♂ very weakly curved. Radial cellule short, about double the length of the first abscissa of the radius, which is about two-thirds of the length of the second; the latter is curved; cubitus almost obsolete.
Length 1¼—1½ mm.

From the other red-headed species with black thorax, *A. flavicornis* is readily known by the long clear yellow antennæ.

Not uncommon. Clydesdale, London district.
Germany, Austria.

6. Allotria victrix.

Pl. XVI, fig. 2.

Allotria victrix, Westwood, Loud. Mag., vi, 494; Giraud, Verh. z.-b. Ges. Wien, x, 127, 3; Cam., Fauna, 85.
Cynips ruficeps, Zetterstedt, Ins. Lapp., 410, 5.
Xystus erythrocephalus, Htg., Germ. Zeit., ii, 199, 1.
Allotria erythrocephala, Thoms., Oef., xviii, 406, 1.

Black, shining, the median segment and base of abdomen bearing a white pubescence; the head red; the legs and basal four or six joints of the antennæ yellow, the rest of the antennæ blackish to fuscous; wings hyaline, ciliated, the nervures pale. Antennæ a little longer than the body, thickened towards the apex in the ♀; in the ♂ the fourth and fifth joints are curved, sinuated. Areolet large, the length twice the width of the first abscissa of the radius; the latter is straight, the second curved; the cubitus does not reach much beyond the radial cellule.
Length 1—1½ mm.

In some specimens the apex of the antennæ is testaceous; sometimes the third joint in the ♂ is distinctly curved.

Common. Lives on rose aphis.
Germany, Sweden, France, Austria.

Obs.—The *Cynips erythrocephala*, Jurine (Nouv. Méth., pl. xii, gen. 40), is not this species if the figure is correctly drawn. It may not even be an *Allotria*. Certainly the antenna of the ♂ does not belong to *Allotria*.

7. Allotria Tscheki.

Pl. XVI, fig. 3.

Allotria Tscheki, Giraud, Verh. z.-b. Ges. Wien, x, 128, 4.

Black; the head red, broadly black on the vertex; the basal four or six joints of the antennæ and legs yellow or testaceous; wings hyaline, the nervures fuscous. Antennæ a little longer than the body, thickened towards the apex; in the ♂ joints three to five sinuated, but not very strongly. Radial cellule moderate, not twice the length of the basal abscissa of the radius; the latter straight, the second abscissa slightly curved; cubitus short. Median segment rather densely, the base of abdomen but slightly pilose.

Length 1¼—1½ mm.

Differs from preceding in having the vertex broadly black and the radial cellule shorter. It is probably only a variety of *victrix*. Feeds, according to Giraud, on the aphis of *Ribes rubrum*.

Not uncommon in the south-west of Scotland; Gloucestershire.

Austria.

8. Allotria circumscripta.

Pl. XVI, fig. 4.

Xystus circumscriptus, Htg., Germ. Zeit., iii, 351.
Allotria circumscripta, Gir., Verh. z.-b. Ges. Wien, x, 127.

Black; the basal four or five joints of the antennæ reddish-testaceous; the legs ferruginous-yellow; the tips of the tarsi black; wings hyaline, the nervures fuscous. Antennæ longer than the body, thickened perceptibly towards the apex in the ♀; in what I regard as the ♂ joints three to six are curved, the latter feebly; and the antennæ are much lighter towards the apex, and not deep black as in the ♀. Radial cellule elongated, its length more than twice the length of the basal abscissa of the radius; the first abscissa is scarcely straight, and the second is but feebly curved; cubitus almost completely obsolete. The median segment and base of abdomen with a longish pubescence.

Length 1—1½ mm.

The yellowish legs, and the large elongated radial cellule separate this species easily.

Clydesdale, Dumfriesshire.

Germany, Austria.

9. Allotria minuta.

Pl. XVI, fig. 5.

Xystus minutus, Htg., Germ. Zeit., ii, 200.
Xystus heterocerus, Htg., l. c., iii, 351.
Allotria minuta, Gir., Verh. z.-b. Ges. Wien, x, 127; Thoms., Oef., xviii, 407; Cam., Fauna, 86, 11.

Black; the base of antennæ and legs yellow-testaceous; the head sometimes piceous, especially on the lower side; wings hyaline, ciliated, the nervures pallid fuscous. Antennæ as long as the body; in the ♂ longer, and with joints three to five weakly curved. Radial cellule short, about one-half longer than broad; the first abscissa of the radius a little more than two-thirds of the length of the second, which is curved; cubitus obsolete. Pubescence on the median segment and base of abdomen sparse.

Length 1 mm.

The colour of the legs varies; they may be pure testaceous, or they may have the femora infuscated. The head and thorax, again, may be piceous, and the head even reddish. The size of the radial cellule varies slightly, and in some specimens the cubitus is traced to the middle; further, the base of the abdomen may be reddish.

Not uncommon. Clydesdale, Gloucestershire.

10. Allotria longicornis.

Pl. XVI, fig. 6.

Xystus longicornis, Htg., Germ. Zeit., ii, 199.
Allotria longicornis, Thoms., Oef., 407; Cam., Fauna, 86.

Black, sometimes piceous-black; the mouth region piceous; the flagellum fuscous, or fuscous-black, the basal joints obscure testaceous; legs fuscous-testaceous, the coxæ and femora usually darker than the rest; wings hyaline, the nervures testaceous. The antennæ are longer than the body; joints three to five sharply curved in the ♂. Radial cellule moderately elongated, more than twice the length of the basal

abscissa of radius. The second abscissa is but slightly curved; cubitus reaching to the middle.
Length 1½—1¾ mm.

Thomson's *longicornis* may be a different species. He describes the legs and base of antennæ as testaceous. Hartig states that the cubitus is obsolete, while in the species I have described it extends for more than half the length of the wing. In the diagnosis (Germ. Zeits., ii, p. 199) Hartig describes the legs as "pale fuscous-red;" in the table in vol. iii, l. c., p. 350, as "red."

Common Clydesdale, Linlithgowshire, Dumfriesshire.

Germany, Sweden.

Hartig bred it from the galls of *Nematus gallicola*, no doubt from an aphis which had entered the gall.

11. Allotria curvicornis.

Pl. XVI, fig. 8.

Allotria curvicornis, Cam., Trans. Ent. Soc., 1883, p. 366.

Black; the head inclining to piceous, the basal four or five joints of the antennæ fuscous; mouth piceous; legs dull testaceous; the coxæ and femora almost piceous at the base; wings hyaline, nervures fuscous. Antennæ longer than the body, as long as the fore-wings; the third joint is slightly, and the fourth and fifth distinctly curved and a little thickened; the sixth is very slightly bent, but not so much as the third. The radial cellule is of moderate length, wide, twice longer than broad; the second abscissa curved, a little more than twice the length of the first. The cubitus only traced at the base. The pubescence on the median segment is distinct; the petiole piceous.
Length 1¾ mm.

Differs from *A. longicornis* in the much shorter radial cellule, somewhat shorter antennæ, these also in *longicornis* ♂ not having joints four to five curved.

Rare. Glen Lyon, in July.

12. Allotria ancylocera.

Pl. XVI, fig. 7.

Allotria ancylocera, Cam., Fauna, 85, 8.

Black; the head below the eyes piceous-red; the antennæ fuscous; joints two to four pallid-testaceous; legs fuscous-testaceous; the coxæ and femora much darker; the anterior four femora lighter coloured than the posterior at the sides, but lined with black above and beneath. Wings hyaline, nervures testaceous. Antennæ longer than the body; the third joint a little shorter than the fourth, slightly curved, the fourth and fifth deeply curved; the apical joint shorter a little than penultimate. Radial cellule of moderate length; the curved apical abscissa of radius scarcely twice the length of oblique basal part; the cubitus extends a little beyond the middle of the wings. ♂.

Length scarcely 1·5 mm.

Agrees in general form and coloration with *A. longicornis*, but is smaller; the antennæ are scarcely so long, and with joints three to five thicker and distinctly curved; the radial cellule shorter, and with the apical abscissa longer in proportion to basal. *A. curvicornis* may be known from it by the antennæ issuing from distinct tubercles and distinctly longer, the fourth and fifth more twisted, the radial cellule shorter and wider, and the cubitus shorter.

Rare. Carruber Glen, Linlithgowshire, August 14th.

13. Allotria dolichocera.

Pl. XVI, fig. 9.

Allotria dolichocera, Cam., Mem. Lit. and Phil. Soc. Man. (4), ii, 56.

Black; the mouth, the base of the antennæ (joints one to four), and legs pallid testaceous, castaneous or infuscated broadly in the middle; wings hyaline, the nervures fuscous. Antennæ longer than the body, very slightly thickened towards the middle; the third and fourth joints subequal, a little longer than the second; the last joint fully one-half longer than the penultimate. Radial cellule wide, the second abscissa fully one and a half times the length of the second, almost straight.

Length ¾ mm.

What is probably the ♂ has the antennæ filiform, one-fourth longer than the body; the third joint curved; the base of the abdomen rufous.

A. brevis, Thomson (Oef., xviii, p. 408, No. 9), comes very near this species, but it has the antennæ only the length of the thorax.

Rare. Clydesdale, Dumfries.

14. Allotria collina.

Pl. XVI, fig. 10.

Allotria collina, Cam., Mem. Lit. Phil. Soc. Man. (4), ii, 57.

Black, the oral region, the thorax and base of abdomen castaneous; the basal four joints of the antennæ and legs pallid testaceous, the femora inclining to castaneous; wings hyaline, the nervures fuscous. Antennæ nearly one-half the length of the body, thickened gradually (but not strongly) towards the apex; the third joint not much longer than the second; the last longer than the penultimate. Radial cellule elongate, the third abscissa of radius two and a half times the length of the second.

Length $\frac{3}{4}$ mm.

Most nearly related to *A. dolichocera*, but easily known by the castaneous thorax and base of abdomen, by the more slender and, if anything, longer antennæ, by the clear colour of the legs, and by the more elongated radial cellule.

Rare. Dumfries.

15. Allotria Mullensis.

Pl. XVII, fig. 1.

Allotria Mullensis, Cam., Trans. Ent. Soc., 1883, 366.

Black; head dull ferruginous, vertex piceous, as is also the pleura; basal five joints of antennæ pale testaceous, the rest fuscous; legs dull testaceous, the coxæ and femora fuscous. Third joint of antennæ longer than the fourth; joints three to five thin, the others much thicker and becoming thicker towards the apex; the last joint one-half longer than the penultimate. Median segment and coxæ covered with dense white pubescence. Wings hyaline, the base yellowish; nervures pallid yellow; the radial cellule truncate, almost semicircular, not much longer than broad; nervures thick; cubitus shorter than the length of radial cellule; fringe on wings long. ♀.

Length $\frac{3}{4}$ mm.

In this species the radial cellule is smaller than in

any other British species of this group, and forms almost a semicircle.
Rare. Mull, in June.

(*b*) *Abdomen at apex rounded; the segments connate.*

16. Allotria microcera.

Pl. XIV, fig. 5.

Charips microcera (Haliday), Marshall, E. M. M., vi, 181; Cam., Trans. Ent. Soc., 1879, 117.

Black, shining; antennæ pale testaceous, the basal joint black, the apical joints pale fuscous; legs pale testaceous, the coxæ, femora, and tibiæ in the middle obscure fuscous; base of abdomen with a dark fuscous hair-fringe. Antennæ as long as the body, stout, the third joint curved, thickened, longer than the fourth. Radial cellule small, longer than broad; the nervures curved, very faint. Abdomen compressed, especially at the apical half.
Length a little over 1 mm.

A distinct species. The abdomen is differently formed from what it is in the other species. It is longer, more compressed, and instead of being oblique at apex (looking at it laterally) it is semicircular. I can discover no trace of segmentation in the abdomen, and it looks to me as if the second segment formed the entire abdomen. The form of the antennæ, wings, and thorax agrees with *Allotria*, and in the absence of a ♀ I now prefer to place it here rather than (as I formerly did) in the *Figitina*.

There is a specimen in Mr. Marshall's collection labelled "*Charips microcera*." Mr. Marshall states that "*Charips microcera*" was an insect so named in MS. by Haliday, "allied to *Allotria*, but having the two apical joints of the antennæ connate" (Marshall, l. c.).

Colvend, Kircudbrightshire; Dalry, Dumfries. One specimen of what is no doubt the same species is almost entirely piceous.

B. *Wings abbreviated.*

17. Allotria pedestris.

Pl. XV, fig. 3.

Cynips pedestris, Curt., B. E., 320, No. 32.
Xystus cursor, Htg., Germ. Zeit., ii, 200.
Allotria cursor, Gir., Verh. z.-b. Ges. Wien, x, 131.
Allotria pedestris, Cam., Fauna, 88, 27

Black; the head and thorax sometimes piceous; the antennæ fuscous, pallid testaceous at the base; the legs obscure testaceous, obscured more or less with fuscous. Antennæ in ♀ thickened towards the apex, the third joint about one fourth longer than the succeeding; in the ♂ longer than the body. Wings abbreviated, seldom extending much beyond the base of the abdomen.
Length 1—1¼ mm.

Not rare. Mull, Clydesdale, New Galloway. Germany, Austria.

II. Radial cellule open (=*Alloxysta* and *Pezophycta*).

1. *Wings fully developed.*

Differs simply from *Allotria* in having an open radial cellule. *Pezophycta* only differs in having the wings more or less abbreviated. The radial cellule is frequently distinct and is certainly open on the fore margin, and the radial nervure terminates before reaching the costa. *Dylita*, Foerster (l. c., p. 340), is distinguished from *Alloxysta* merely by the last-mentioned peculiarity; so that if it is to be regarded as a distinct genus, *Pezophycta* should be placed in it, rather than in *Alloxysta*.

Synopsis of Species.

1 (18) Thorax black.
2 (9) Head red.
3 (4) Radial cellule greatly elongate. *Macrophadna.*
4 (3) Radial cellule not greatly elongate.
5 (6) Collar broadly red. *Maculicollis.*
6 (5) Collar entirely black.
7 (8) Base of abdomen red; antennæ thickened towards the apex, broadly and darkly infuscated; legs reddish-testaceous. *Basimacula.*
8 (7) Base of abdomen black; antennæ thickened towards the apex; legs yellowish-testaceous. *Filicornis.*
9 (2) Head black.
10 (13) Radial cellule minute, more or less trapezoidal; legs clear yellow.
11 (12) Antennæ clear citron-yellow, hardly infuscated towards the apex; radial cellule twice longer than broad; the apical abscissa of radius not distinctly curved. *Citripes.*
12 (11) Antennæ blackish, yellow at the base; radial cellule not twice longer than broad; the apical abscissa of radius roundly and distinctly curved. *Trapezoidea.*
13 (10) Radial cellule elongate, much longer than broad; legs and antennæ not citron-yellow.
14 (15) Legs and base of antennæ clear testaceous-red; radial cellule elongate; the first abscissa of radius more than twice the length of the second. *Ullrichi.*
15 (14) Legs testaceous, with the femora infuscated; radial cellule not elongated; the first abscissa of radius scarcely twice the length of the second.
16 (17) Legs reddish-testaceous; the femora lined with fuscous; the basal abscissa of radius twice the length of the third. *Perplexa.*
17 (16) Legs pale testaceous; the femora fuscous; the joints pallid. *Crassa.*
18 (1) Thorax piceous-red or reddish-testaceous (head reddish or castaneous).
19 (20) Legs and antennæ fuscous-testaceous, the femora infuscated; head castaneous; abdomen broadly rufous. *Caledonica.*
20 (19) Legs clear yellow, the femora not infuscated.
21 (22) Head castaneous; abdomen black, reddish at the extreme base; radial cellule elongate. *Piceomaculata.*
22 (21) Head reddish; abdomen broadly reddish, black at apex or base.
23 (24) Length 1½ mm.; abdomen reddish, black at base; radial cellule elongate, narrow; the apical abscissa of radius not distinctly curved. *Testacea.*
24 (23) Length 1 mm.; abdomen black, reddish at the base; radial cellule short, wide; the apical abscissa of radius with a distinct rounded curve. *Nigriventris.*

18. Allotria macrophadna.

Pl. XVII, fig. 5.

Xystus macrophadnus, Htg., Germ. Zeit., iii, 352.
Allotria macrophadna, Gir., Germ. Zeit., x, 130; Thoms., Oef., xviii, 408.

Black; the head red, the base of antennæ broadly and legs reddish yellow; the antennæ a little longer than the body, fuscous, fuscous-testaceous in the ♂, which has the fourth and fifth joints curved. Radial cellule elongated, large; the second abscissa of radius is curved, and more than twice the length of the first. The fringe on the wings is close and longish; the pubescence on the median segment and base of abdomen moderate.
Length 1½—1¾ mm.

Sometimes the thorax becomes piceous.

In this species the radial cellule is longer than in any other.

Common. Clydesdale, Manuel.
Sweden, Germany, Austria.

19. Allotria filicornis.

Pl. XVII, fig. 7.

Allotria filicornis, Cam., Mem. Lit. and Phil. Soc. Man. (4), ii, 57.

Black; the thorax in one or two specimens inclining slightly to fuscous; the head red, the vertex castaneous; the antennæ and legs clear yellow, the former slightly infuscated towards the apex; the base of the abdomen red; wings clear hyaline, the nervures pale testaceous. Scutellum, median segment, and base of abdomen rather densely covered with long pale hair. Antennæ longer than the body, stout, the basal two joints subequal, the third a little longer; the fourth and fifth longer than the others, distinctly sinuated; the last joint not longer than the penultimate. Radial cellule of medium size, twice longer than broad; the second abscissa of the radius fully one-half longer than the second, which is twice the length of the first; ♂ cubitus a mere stump; the spurious vein traced to the middle of the wing. ♂.
Length 1¼ mm.

This is a larger species than *basimacula*, the antennæ are of a paler and clearer yellow and not dark fuscous; much stouter, and with the fourth and fifth joints

thicker and more curved; the legs are clear yellow, not reddish-testaceous; the abdomen is larger compared to the thorax, and the radial cellule is wider.

Common in Scotland from Loch Awe to Dumfries.

20. Allotria basimacula.

Pl. XVII, fig. 8.

Allotria basimacula, Cam., Fauna, 87, 18.

Black; the head (the vertex obscured with black or dark castaneous) and base of abdomen red; the basal five joints of antennæ and legs yellow; wings hyaline, nervures testaceous; median segment and base of abdomen densely covered with long white hair. Antennæ a little longer than the body, stout; the fourth joint longer than either the third or fifth; last joint about one-fourth longer than penultimate. Radial cellule elongated, of moderate length; the basal abscissa scarcely twice the length of apical and not much curved; cubitus obsolete. ♀.

The ♂ has the antennæ longer, and with the fourth and fifth joints slightly curved and thickened, the third shorter than the fourth; the femora are darker, the yellow being suffused with fuscous.

Length scarcely 1 mm.

May be known from *A. filicornis* by its smaller size, by the thicker antennæ, which become perceptibly thickened towards the apex, and by the narrower radial cellule. The ♂ has the antennæ shorter, and has the third joint shorter than the fourth.

Glen Lyon, Perthshire; Mugdoch, near Glasgow.

21. Allotria maculicollis.

Pl. XVII, fig. 6.

Allotria maculicollis, Cam., Fauna of Scot., 87, 16.

Black; head red; antennæ and legs yellow, the apex of antennæ inclining to fuscous; a large obscure red mark on the sides of prothorax; wings hyaline, nervures fuscous; median segment, scutellum, and base of abdomen densely covered with longish white hair. Antennæ nearly one-fourth longer than the body, attenuate; the last joint compressed, longer than the penultimate; fourth longer than either the third or fifth. Radial cellule broad, short; the apical branch of the radial nervure curved, scarcely twice the length of the oblique basal abscissa, which is hardly one-fourth longer than the cubital branch; cubitus scarcely reaching to the middle. Besides the reddish

mark in the centre, the prothorax is reddish-piceous along the edges, especially on the pronotum. ♂.
Length 1·5 mm.

Nearly related to *macrophadna*, but easily known by the much shorter radial cellule, by the reddish prothorax, and by the entirely yellow antennæ.
New Galloway.

22. Allotria Ullrichi.

Pl. XVII, fig. 10.

Allotria Ullrichi, Giraud, Verh. z.-b. Ges. Wien, x, 130.

Black; the face, joints one to five of the antennæ and legs reddish-testaceous. Antennæ filiform, not thickened towards the apex, longer than the body; the pubescence on the median segment and base of abdomen dense; the third joint of the antennæ a little longer than the fourth, the last sharply conical at the apex, and one-half longer than the penultimate. Radial cellule wide; the second abscissa of the radius two and a half times the length of the second; wings hyaline, nervures fuscous. The ♂ is similar; none of the antennal joints are curved.
Length 1 mm.

Apart from the legs being of one colour, this species may be known from *perplexa* by the antennæ being longer, more filiform, and not thickened towards the apex. *A. obscurata*, Htg. (Germ. Zeits., ii, p. 204), is a closely allied species, but is no doubt different, it having the antennæ subclavate, the wings "obscurantis," and the nervures black. In *Ullrichi* the base of the abdomen is sometimes reddish.

I am not quite sure about this species being *A. Ullrichi*, Giraud's description being rather short: Nigra, nitida; ore, antennarum basi pedibusque rufo-testaceis. Cellula radialis elongata, ♂. Long. 1 mm. The wing nervures are described as reddish. Our species agrees with that description fairly well.
Common. Clydesdale, Dumfries.
Austria.

23. Allotria perplexa.

Pl. XIV, fig. 4.

Allotria perplexa, Cam., Mem. Lit. and Phil. Soc. Man. (4), ii, 59.

Black; joints one to five of the antennæ and legs testaceous, the femora broadly black or infuscated in the middle; wings hyaline, the nervures pale fuscous. Antennæ as long as the body, distinctly thickened towards the apex; the third joint one-fourth longer than the fourth; the last one-half longer than the penultimate. Radial cellule moderate, broad, the first abscissa half the length of the second, which is a little more than twice the length of the third; the third abscissa slightly curved; the hair on median segment and base of abdomen very dense.

The ♂ has the antennæ filiform, longer than the body, the third joint longer than the fourth, curved.

Length 1¼ mm.

There are two described species with darkened femora and testaceous tibiæ and tarsi, as in *perplexa* and *crassa*, namely, *A. aperta* (Germ. Zeits., iii, p. 353) and *A. fuscipes*, Thoms. (Oef., xviii, 410); but both differ from *perplexa* and *crassa* in having the antennæ shorter, *fuscipes* having them scarcely longer than the thorax, and *aperta* almost shorter than the thorax.

Common. Bonar Bridge, Sutherlandshire; Clydesdale.

24. Allotria crassa.

Pl. XIV, fig. 6.

Allotria crassa, Cam., Mem. Lit. Phil. Man. (4), ii, 59.

Black, the scape fuscous; joints two to five of antennæ, the apex of femora and tibiæ more or less, and the tarsi, testaceous; the remainder of the legs fuscous; wings hyaline, the nervures fuscous. Radial cellule elongated, narrow; the basal abscissa of the radius about one-third of the length of the second; cubitus short, obscure. Antennæ as long as the body, thickened towards the apex; the third joint one-half longer than the fourth, the last a little longer than the penultimate.

What is probably the male has the antennæ filiform, longer than the body, the basal three joints pale testaceous, the others dark fuscous.

Length 1 mm.

A smaller species than *perplexa;* the antennæ are shorter, the head inclines to piceous in colour, the radial cellule is more elongated, and has the second

abscissa of the radius fully three times the length of the third, the legs are pale testaceous, not reddish, and are especially pallid at the joints.

Bonar Bridge, Sutherlandshire; Cladich, Loch Awe, Dumfries.

25. Allotria citripes.

Pl. XVII, fig. 9.

Allotria citripes, Thomson, Oef., xviii, 410, 18.

Black; the face and oral region piceous-red; the antennæ and legs yellow; wings hyaline, the nervures pallid yellow. The radial cellule minute, not much longer than broad; the first abscissa of radius more than half the length of the second; cubitus obsolete beyond the short stump; the margin with a long fringe. Antennæ longer than the body, thickened very perceptibly towards the apex.

Length scarcely 1 mm.

Mull, Cladich, Loch Awe; Kenmuir Bank, near Glasgow, Dumfries.

Sweden.

26. Allotria trapezoidea.

Xystus trapezoideus, Htg., Germ. Zeits., iii, 352, 24.

Dull black, inclining to piceous; the head dull red, castaneous on the top; the basal five joints of the antennæ and legs yellow; wings hyaline, the nervures thick, pallid yellow. Antennæ a little longer than the body, becoming gradually but distinctly thickened towards the apex, the third joint a little longer than the fourth; wings thickly pilose, the fringe long; radial cellule small, one-half longer than broad; the second abscissa of radius straight, three-fourths of the length of the third, which is distinctly curved, especially towards the apex; cubitus a short but distinct stump. The wings are longer than the body; the median segment and base of abdomen moderately pilose; the tips of the tarsi blackish.

Length ¾ mm.

There is no doubt, I think, that this species is distinct from *citripes*, it being somewhat smaller than it and less stout; the apical three-fourths of the antennæ distinctly blackish; the colour of the legs has a

marked reddish hue, not clear citron-yellow ; the radial cellule is wider and not quite so long, and the third abscissa of the radius is much more distinctly curved. Hartig describes the oral region, antennæ, legs, and alar nervures as " obscure castaneous-red," our species thus differing in having the antennæ of two colours.

Rare. Gloucestershire.

Continental distribution : Germany.

27. Allotria castanea.

Xystus castaneus, Htg., Germ. Zeits., ii, 351 and 352, 19.

Castaneous-red; joints 1—6 of antennæ and legs clear yellow, the apical joints of antennæ fuscous; the apical half of the abdomen blackish; wings hyaline, the nervures pale yellow. Antennæ rather stout, longer than the body; the third joint a little longer than the fourth, neither it nor the fourth being curved. Radial cellule elongate, more than twice longer than broad; the nervures pale.

Length 1½ mm.

This is a larger and stouter insect than *Caledonica* and *piceomaculata*. *Piceomaculata* has the head castaneous, and the thorax has not the clear testaceous-red of *castanea ;* the antennæ are much blacker, and the abdomen is only reddish at the base, while in *castanea* the abdomen is red, black only at the extreme apex. The infuscated legs of *Caledonica* with the much shorter radial cellule sufficiently distinguish it.

Rare.

Germany.

28. Allotria nigriventris.

Pl. XVII, fig. 4.

Allotria nigriventris, Thoms., Oef., xviii, 409, 13.

Rufo-testaceous, the thorax tinged with piceous; the antennæ yellowish-testaceous, infuscated towards the apex; the legs clear yellow; wings hyaline, the nervures fuscous. Antennæ longer than the

body, the fourth and fifth joints curved. Radial cellule small, twice as long as wide; the basal abscissa of radius half the length of the second, which is curved; cubitus very faintly traced for half the length of the wing; fringe moderately thick. ♀.

Length scarcely 1 mm.

Comes near to *piceomaculata*, but the head is reddish-testaceous; the thorax is lighter in tint; the antennæ are only infuscated towards the apex, not dark fuscous; the radial cellule is much shorter and wider in proportion to its length, the apical abscissa of the radius being not twice the length of the second, and more distinctly curved.

Rare. Mugdoch Wood, near Glasgow.

Sweden.

29. Allotria caledonica.

Pl. XVII, fig. 2.

Allotria caledonica, Cam., Fauna, 88, 24.

Castaneous, the apex of abdomen black; legs obscure pallid testaceous, the femora darker coloured; antennæ pallid yellow, infuscated at base and towards the apical half; wings hyaline, nervures testaceous. Antennæ as long as the body, stout, thickened towards the apex; the third joint a little longer than the fourth; the last longer than the penultimate, and slightly thinner than it. Radial cellule short, broad, about one-half longer than broad; apical abscissa roundly curved, one-half longer than the second.

Length nearly 1 mm.

This is the smallest species with castaneous head and thorax, and is easily known by the legs being castaneous, those with *piceomaculata*, &c., being clear yellow. The European *A. castanea* is longer, has the radial cellule more elongated, the base of the antennæ and legs yellowish-red, the thorax is not entirely castaneous, the pro- and median segment being red.

Mugdoch, near Glasgow, July 27th.

30. Allotria piceomaculata.

Pl. XVII, fig. 3.

Allotria piceomaculata, Cam., Trans. Ent. Soc., 1883, p. 367.

Head and thorax piceous; abdomen black; pleuræ dark ferruginous; antennæ black, the base testaceous; legs yellow; wings hyaline, nervures fuscous; radial cellule twice as long as broad; cubitus extending beyond the middle. Antennæ longer than the body, not much thickened towards the apex; the third joint nearly twice the length of fourth.

Length 1 mm.

A somewhat larger species than *caledonica*, with which it agrees in the coloration of the head and thorax, except that the head has the vertex darker; the antennæ are longer and stouter, and have the apical eight joints dark fuscous, the basal being clear yellow; the legs are also clear yellow, the abdomen is reddish only at the extreme base, and the radial cellule is more elongated.

Rare. Dumfries.

2. *Wings abbreviated.*

31. Allotria brachyptera.

Pl. XV, fig. 2.

Xystus brachypterus, Htg., Germ. Zeit., ii, 200.
Allotria brachyptera, Gir., Verh. z.-b. Ges. Wien, x., 131; Thoms., Oef., xviii, 410.

Black; the thorax inclining to piceous, the head reddish-testaceous, castaneous on vertex; antennæ and legs yellowish, tinged with testaceous, the former sometimes infuscated towards the apex; tips of tarsi black. Wings hyaline, abbreviated, seldom reaching before the apex of the abdomen, the nervures fuscous; radial cellule short, the first abscissa of radius about three-fourths of the length of the second, which is but slightly curved; fringe minute.

The ♂ has the antennæ longer than the body; the fourth and fifth joints are curved.

Length ¾—1 mm.

The thorax varies from pure black through piceous to testaceous.

Commonly distributed.
Continental distribution: Sweden, Germany.

32. Allotria halterata.

Pl. XV, fig. 1.

Allotria halterata, Thoms., Oef., xviii, 410; Cam., Fauna, 88, 25.

Reddish-yellow; abdomen black, the legs yellowish testaceous; the antennæ testaceous, sometimes infuscated towards the apex. Antennæ a little longer than the body, but slightly thickened towards the apex; the third joint longer than the fourth. Wings abbreviated, shorter than the thorax. ♀.
Length 1½ mm.

Not common. Near Glasgow.
Sweden.

The following British species are doubtful:

Cynips amygdali, Buckton, bred from *Aphis amygdali*. "Body wholly shining black. Antennæ pilose, with fourteen joints, each after the third slightly increasing in size, the last apical joint the longest. Thorax robust. Abdomen semiglobose, the last ring furnished with an obtuse ovipositor. Wings rounded, the upper wing having only one closed costal cell. Tibiæ armed with a strong spur; tarsi hairy and six-jointed [*sic*]" (British Aphides, ii, p. 150, pl. lxxiii, fig. 6). Neither from the figure nor from the description can I make out to what genus this species belongs.

Curtis describes two species:

Cynips quercus-inferus, L.? Pitch colour, shining, head and thorax rugose, antennæ and mouth bright rust colour; the antennæ fourteen-jointed, wings iridescent, with pale reddish-brown nervures, having an elongate trigonate cellule on the margin, with an

indistinct minute areolet on its inner angle; legs ochreous. Length 1½, alar exp. 3 lines.

In Morton's Cycl. of Agric., where this species is described, it is stated to have been bred from aphides, and also that it originates "globular red excrescences upon oak leaves." There is an evident mixture of species here. The head and thorax being rugose, hardly fits *Allotria*. Curtis compares it with *Allotria fulviceps*.

Cynips fulviceps (B. E., pl. 688). Glossy black, antennæ longish, thirteen-jointed, fuscous, ochreous at base; head and legs bright ochreous; wings iridescent, nervures bright brown; areolet none. Length ½ line; alar exp. nearly 2 lines.

This is certainly an *Allotria*. It is stated by Haliday (Ent. Mag., ii, 102) to prey on the aphides of willows, cow-parsnip, and other plants.

Sub-family IBALINA.

The characteristic features of this very distinct group have been already given (p. 156). It contains only one genus, namely—

Ibalia.

Ibalia, Latreille, Hist. Nat. des Crust. et des Ins., i, 205.

The antennæ are about the length of the abdomen; in the ♀ thirteen-jointed, with the third joint not much longer than the fourth; in the ♂ fifteen-jointed, the third joint strongly obliquely incised. The front is excavated in the middle, the excavation with a distinct margin; the occiput strongly concave; cheeks emarginate. Head and thorax strongly transversely rugosely striolated. Pronotum raised and incised in the middle above. Mesonotum with three longitudinal furrows. Scutellum with two large, smooth

foveæ at the base; the sides of the scutellum margined; the apex deeply incised in the middle. Hind coxæ wide apart; the hind femora stout, somewhat curved, narrowed at base and apex. The spiracle in the last abdominal segment large, distinct. Wings glabrous.

1. Ibalia cultellator.

Pl. XIV, fig. 7, ♀; 11, abdomen.

Ibalia cultellator, Latreille, Hist. Nat. de Crust. et des Ins., i, 205, pl. 100, f. 5; Curtis, B. E., 22; Htg., Germs. Zeit., ii, 203; Giraud, Verh. z.-b. Ges. Wien, x, 175; Thoms., Oef., xviii, 405.

Black; the abdomen ferruginous; wings hyaline, with a smoky tinge from the first cubital cellule, the nervures black. Pleuræ in front finely striated, the rest impunctate, shining; the lower part excavated. ♂ and ♀.

Length 12—12·5 mm.

Very rare. A parasite on *Sirex*. I believe the species has not been found in this country since the time of Curtis.

Continental distribution: Sweden, Germany, France, Italy, Levant.

ADDITIONS AND CORRECTIONS.

Page 56, twenty-third line from top, *add* Pl. I, fig. 8 ♂.
„ 63, second line from top, *for* Pl. IV, fig. 8, *read* Vol. II, Pl. XI, fig. 8.
„ 106, twenty-second line from top, *after* Pamphilius pallipes, *add* Pl. III, fig. 2.
„ 108, twenty-seventh line from top, *after* Pamphilius hortorum, *add* Pl. III, fig. 1.
„ 117, third line from top, *for* Pl. III, fig. 30, *read* Pl. III, fig. 10.
„ 164, second „ „ Pl. VI, fig. 1, „ Pl. VII, fig. 8.
„ 200, „ „ *after* fig. 5, *add* fig. 4, var. *similis*.

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PLATE I.

Fig. 1.—*Hylotoma pagana.*
Fig. 2.—*Hylotoma cyaneo-crocea.*
Fig. 3.—*Hylotoma melanochroa.*
Fig. 4.—*Hylotoma rosæ.*
Fig. 5.—*Hylotoma cæruleipennis.*
Fig. 6.—*Hylotoma enodis.*
Fig. 7.—*Hylotoma gracilicornis.*
Fig. 8.—*Hylotoma ustulata* ♂.
Fig. 9.—*Hylotoma ciliaris.*
Fig. 10.—*Hylotoma atrata.*

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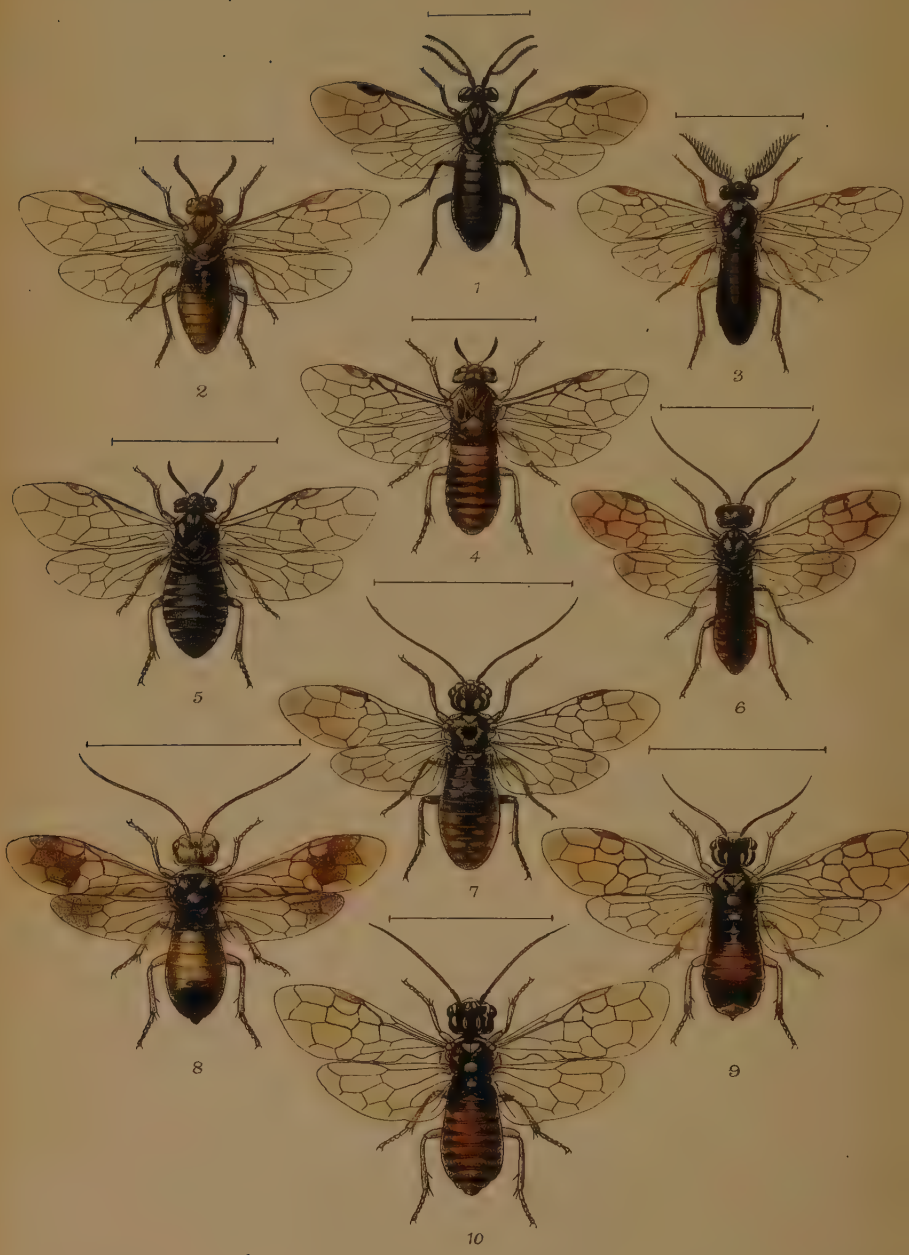

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PLATE II.

Fig. 1.—*Schizocera geminata* ♂.
Fig. 2.—*Lophyrus sertiferus* ♀.
Fig. 3.—*Lophyrus sertiferus* ♂.
Fig. 4.—*Lophyrus virens.*
Fig. 5.—*Lophyrus variegatus.*
Fig. 6.—*Pamphilius stellatus* ♂.
Fig. 7.—*Pamphilius stellatus* ♀.
Fig. 8.—*Pamphilius betulæ.*
Fig. 9.—*Pamphilius depressus.*
Fig. 10.—*Pamphilius* „ var. *albo-pictus.*

PLATE III.

Fig. 1.—*Pamphilius hortorum.*
Fig. 2.—*Pamphilius pallipes.*
Fig. 3.—*Cephus* (*Janus*) *femoratus.*
Fig. 4.—*Cephus pygmæus* ♀.
Fig. 5.—*Cephus pygmæus* ♂.
Fig. 6.—*Cephus pusillus* ♀.
Fig. 7.—*Cephus phthisicus* ♀.
Fig. 8.—*Cephus phthisicus* ♂.
Fig. 9.—*Cephus tabidus* ♀.
Fig. 10.—*Cephus linearis* ♀.

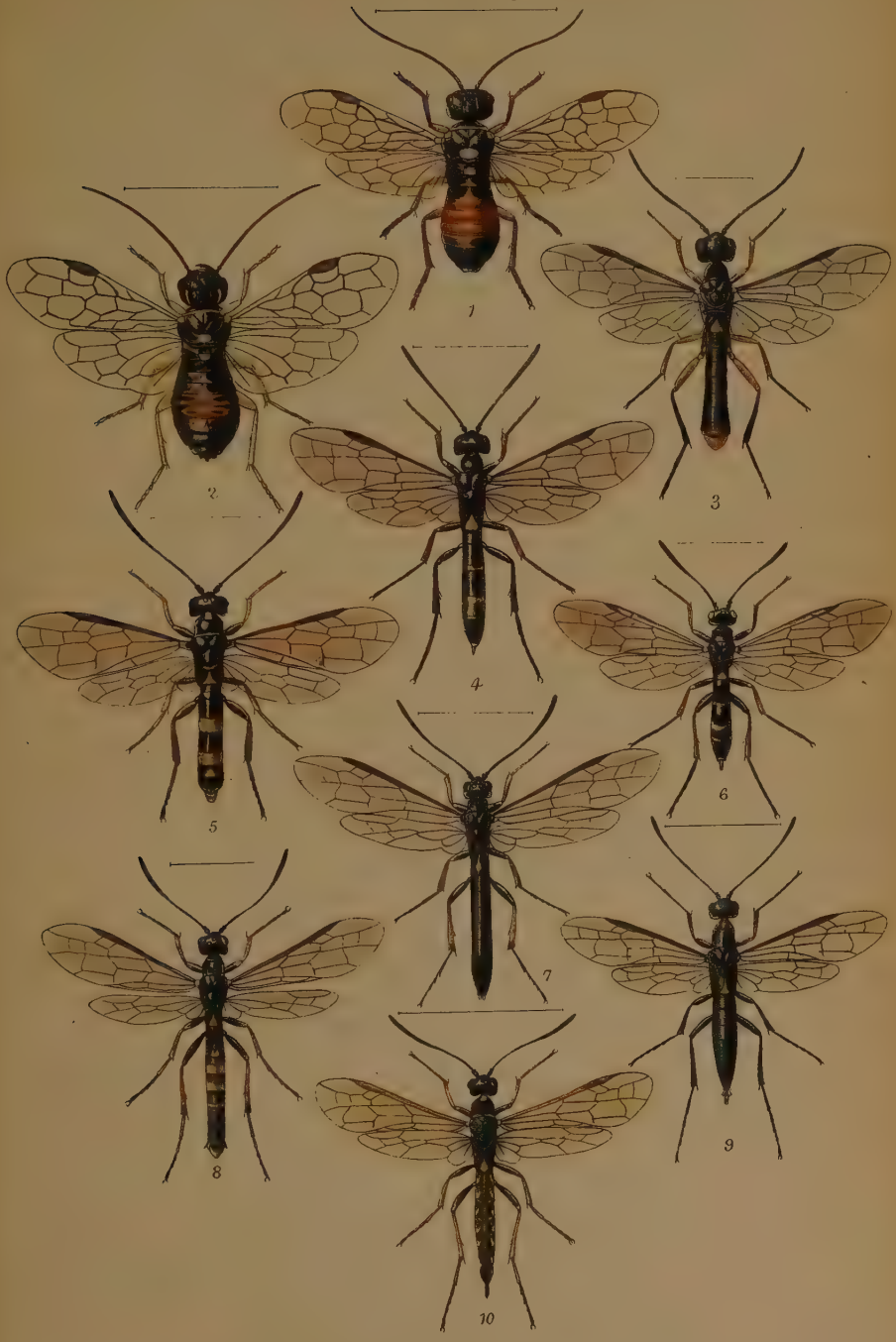

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PLATE IV.

Fig. 1.—Larva of *Hylotoma cœruleipennis* (after Brischke).

Fig. 2.—Maxillary palpus of *Hylotoma ciliaris.*

Fig. 3.—Maxillary palpus of *Hylotoma atrata.*

Fig. 4.—Maxillary palpus of *Hylotoma fuscipes.*

Fig. 5.—Maxillary palpus of *Hylotoma ustulata.*

Fig. 6.—Larva of *Schizocera gemmata* (after Brischke).

Fig. 7.—Larva of *Pamphilius sylvaticus* (after Brischke).

Fig. 8.—Larva of *Cephus pygmæus* (after Curtis).

Fig. 9.—Willow twig with cocoon of *Cephus femoratus.*

Fig. 10.—Pupa of *Xiphydria dromedarius* (after Westwood).

Fig. 11.—Larva of *Xyphydria dromedarius* (after Westwood).

Figs. 12, 12 *a.*—Larva of *Sirex gigas; b, c,* anal segment; *d, e,* sub pupa: 1, tubercles from which the parts of the ovipositor originate; *e,* apex of pupa, 1, ovipositor; *f g,* mandible; *h,* maxilla.

Fig. 13.—Scutellum of *Cynips.*

Fig. 14.—Scutellum of *Figites.*

Fig. 15.—Scutellum of *Eucoela.*

Fig. 16.—Scutellum of *Onychia.*

Fig. 17.—Scutellum of *Aspicera.*

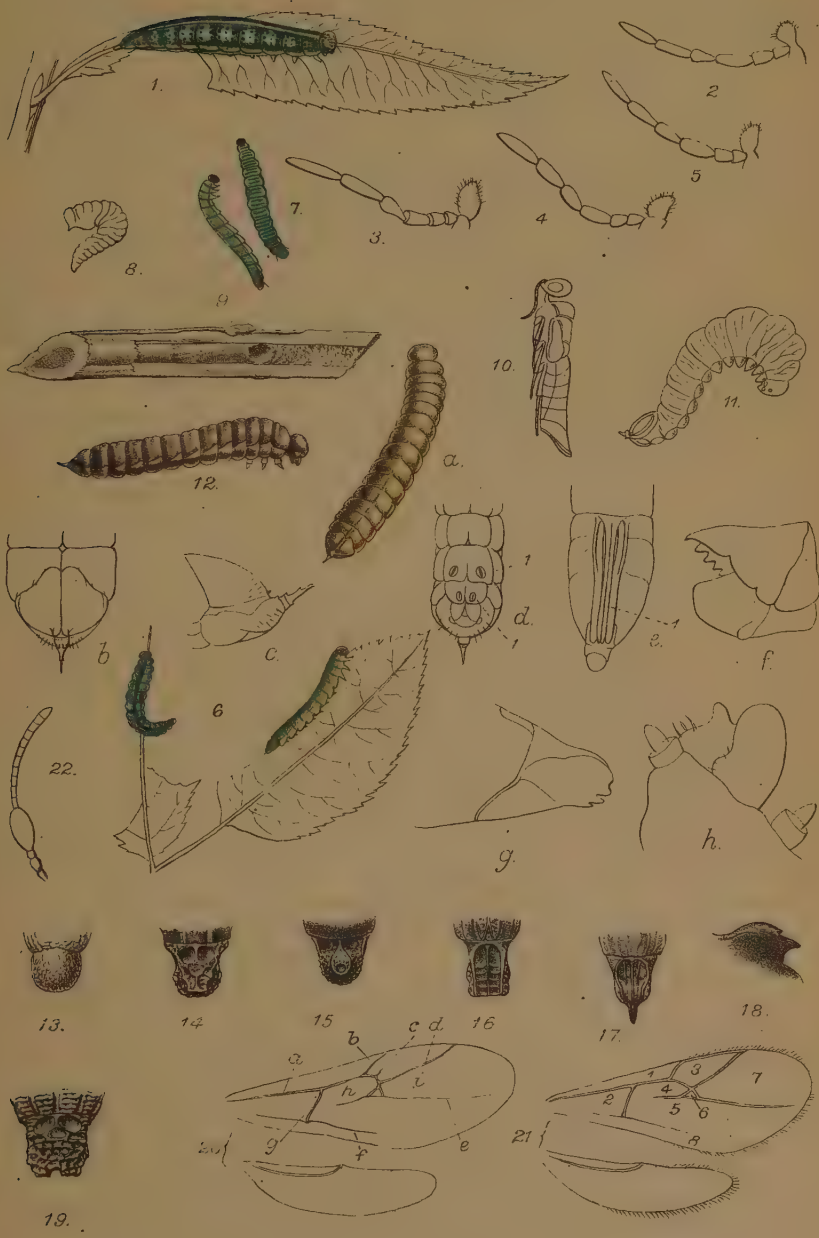
Fig. 18.—Scutellum of *Kleditoma.*

Fig. 19.—Scutellum of *Ibalia.*

Fig. 20.—Wing of *Cynips: a, b,* subcostal; *c, d,* radial; *e,* cubital (cubitus); *f,* median nervure.

Fig. 21.—Wing of *Synergus:* 1, humeral; 2, median; 4, 6, 7, cubital (6, areolet); 5, discoidal; 8, posterior, cellules.

Fig. 22.—Antennæ of *Synergus incassatus.*



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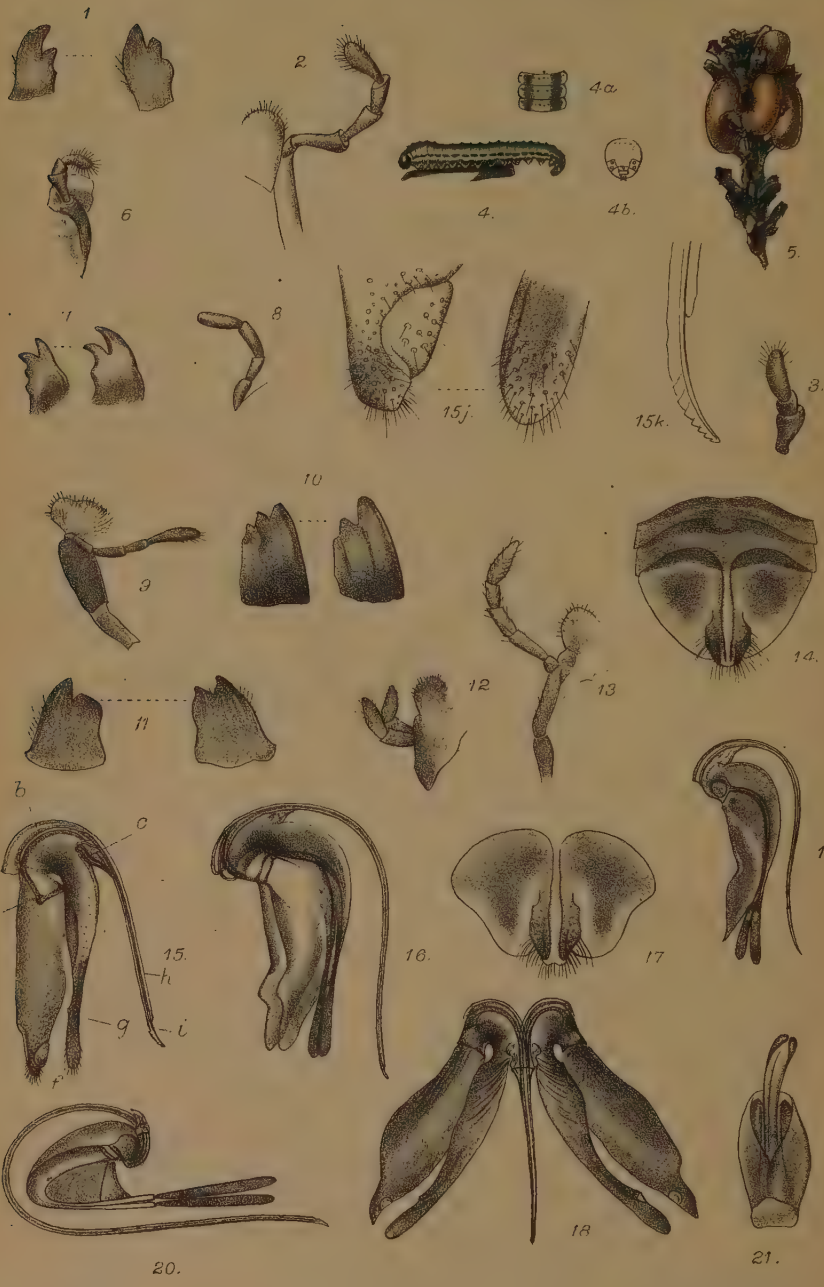

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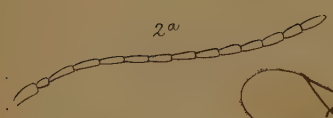
PLATE V.

Fig. 1.—Mandibles of *Cynips*.
Fig. 2.—Maxilla of *Cynips*.
Fig. 3.—Labial palpus of *Cynips*
Fig. 4.—Larva of *Lophyrus sertiferus*.
Fig. 5.—Cocoons of *Lophyrus sertiferus*.
Fig. 6.—Labium of *Anacharis*.
Fig. 7.—Mandibles of *Anacharis*.
Fig. 8.—Maxillary palpus of *Anacharis*.
Fig. 9.—Maxilla of *Amblynotus*.
Fig. 10.—Mandibles of *Amblynotus*.
Fig. 11.—Mandibles of *Trigonopsis*.
Fig. 12.—Labium of *Trigonopsis*.
Fig. 13.—Maxilla of *Trigonopsis*.
Fig. 14.—Apex of abdomen of *Cynips*.
Fig. 15.—Ovipositor of *Dryophanta*. *a*, apical; *c*, basal attachment of support; *b*, attachment to triangular plate, *d*, *e*, anterior, *g*, posterior plate; *f*, anal papilla; *h*, sheath; *i*, ovipositor.
Fig. 16.—Ovipositor of *Dryophanta*.
Fig. 17.—Apex of abdomen of *Dryophanta foli*.
Fig. 18.—Ovipositor of *Dryophanta*.
Fig. 19.—Ovipositor of *Andricus*.
Fig. 20.—Ovipositor of *Figites*.
Fig. 21.—♂ organ of *Trigonopsis*.



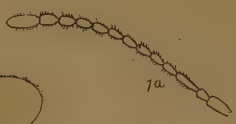


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PLATE VI.

Fig. 1.—*Melanips urticeti.* 1 *a*, *antennæ* ♀.
Fig. 2.—*Ægilips armata* ♀.
Fig. 3.—*Ægilips scotica* ♂.
Fig. 4.—*Ægilips striolata* ♂.
Fig. 5.—*Ægilips bicolorata* ♂.
Fig. 6.—*Ægilips subulifera* ♂.
Fig. 7.—*Ægilips rufipes* ♀.
Fig. 8.—*Ægilips ruficornis* ♀.
Fig. 9.—*Ægilips nitidula* ♂.

PLATE VII.

Fig. 1.—*Ægilips fumipennis.*
Fig. 2.—*Anacharis typica.*
Fig. 3.—*Anacharis eucharoides.*
Fig. 4.—*Anacharis ensifera.*
Fig. 5.—*Anacharis immunis.*
Fig. 6.—*Onychia Westwoodi.*
Fig. 7.—*Anolytus rufipes.*
Fig. 8.—*Pychnotrichia urticarum.*

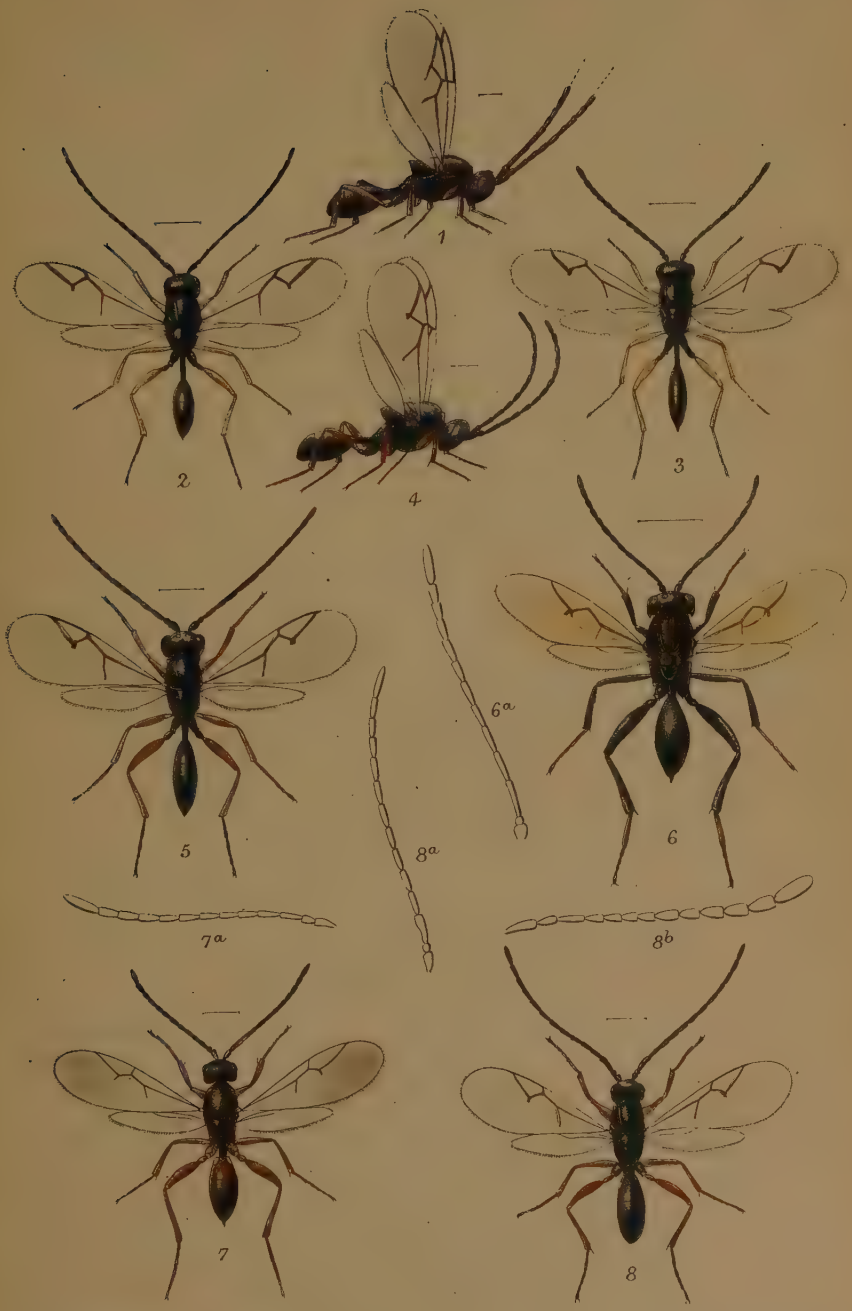

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PLATE VIII.

Fig. 1.—*Amblynotus opacus.*
Fig. 2.—*Amblynotus femoralis.*
Fig. 3.—*Figites scutellaris.*
Fig. 4.—*Figites consobrinus.*
Fig. 5.—*Figites anthomyiarum.*
Fig. 6.—*Figites nitens.*
Fig. 7.—*Sarothrus canaliculatus.*
Fig. 8.—*Sarothrus areolatus.*
Fig. 9.—*Lonchidia maculipennis.*
Fig. 10.—*Lonchidia clavicornis.*

PLATE IX.

Fig. 1.—*Eucoela longicornis.*
Fig. 2.—*Eucoela Marshalli.*
Fig. 3.—*Eucoela rufula.*
Fig. 4.—*Eucoela mandibularis*, var. *similis.*
Fig. 5.—*Eucoela mandibularis.*
Fig. 6.—*Eucoela gracilicornis.*
Fig. 7.—*Eucoela glottiana.*
Fig. 8.—*Eucoela proxima.*
Fig. 9.—*Eucoela fortinervis.*
Fig. 10.—*Eucoela erythrocera.*

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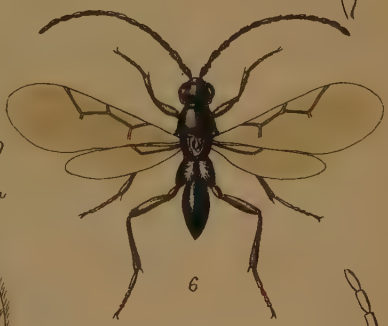
PLATE X.

Fig. 1.—*Microstilba heterogena* ♀.
Fig. 2.—*Kleditoma psiloides* ♀.
Fig. 3.—*Eucoela Boienii* ♂.
Fig. 4.—*Eucoela crassinerva.*
Fig. 5.—*Eucoela rapæ* ♀.
Fig. 6.—*Eucoela rapæ* ♂.
Fig. 7.—*Eucoela diaphana.*
Fig. 8.—*Eucoela testaceipes.*
Fig. 9.—*Eucoela nigricornis.*
Fig. 10.—*Kleditoma melanopoda.*

PLATE XI.

Fig. 1.—*Kleditoma subaptera* ♂.
Fig. 2.—*Kleditoma subaptera* ♀.
Fig. 3.—*Kleditoma halophila.*
Fig. 4.—*Eucoela heptoma* ♂.
Fig. 5.—*Eucoela eucerus* ♀.
Fig. 6.—*Eucoela hexatoma* ♂.
Fig. 7.—*Eucoela* „ ♀.
Fig. 8.—*Kleditoma picicrux.*
Fig. 9.—*Cothonaspis pentatoma.*



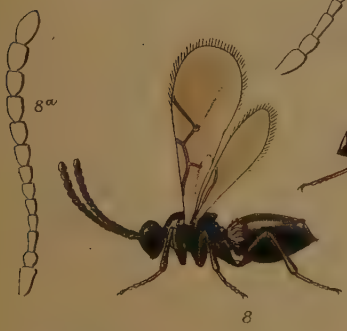


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PLATE XII.

Fig. 1.—*Eucoela cubitalis.*
Fig. 2.—*Eucoela ciliaris.*
Fig. 3.—*Eucoela scotica.*
Fig. 4.—*Eucoela crassicornis.*
Fig. 5.—*Kleditoma pygmæa.*
Fig. 6.—*Kleditoma pentatoma.*
Fig. 7.—*Kleditoma pentatoma* (*albipennis*).
Fig. 8.—*Kleditoma elegans.*
Fig. 9.—*Kleditoma longipennis.*
Fig. 10.—*Kleditoma picipes.*

PLATE XIII.

Fig. 1.—*Kleditoma dolichocera.*
Fig. 2.—*Kleditoma truncata.*
Fig. 3.—*Kleditoma striata.*
Fig. 4.—*Kleditoma tetratoma.*
Fig. 5.—*Kleditoma gracilicornis.*
Fig. 6.—*Kleditoma nigripes.*
Fig. 7.—*Kleditoma nigra.*
Fig 8.—*Kleditoma crassiclava.*
Fig. 9.—*Kleditoma longicornis.*
Fig. 10.—*Kleditoma Marshalli.*

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PLATE XIV.

Fig. 1.—*Glauraspidia microptera ;* 1 *a*, antenna.
Fig. 2.—[Figure inserted in mistake] 2 *a*, antenna.
Fig. 3.—*Kleditoma filicornis ;* 3 *a*, antenna.
Fig. 4.—*Allotria perplexa ;* 4 *a*, antenna.
Fig. 5.—*Allotria microcera ;* 5 *a*, antenna.
Fig. 6.—*Allotria crassa.*
Fig. 7.—*Ibalia cultellator.*
Fig. 8.—Abdomen of *Ægilips.*
Fig. 9.—Abdomen of *Onychia.*
Fig. 10.—Abdomen of *Cynips.*
Fig. 11.—Abdomen of *Ibalia.*
Fig. 12.—Abdomen of *Rhodiles.*
Fig. 13.—Abdomen of *Figites.*
Fig. 14.—Abdomen of *Allotria.*
Fig. 15.—Larva of *Anacharis* (after Handlirsch) ; 15 *a*, pupa.

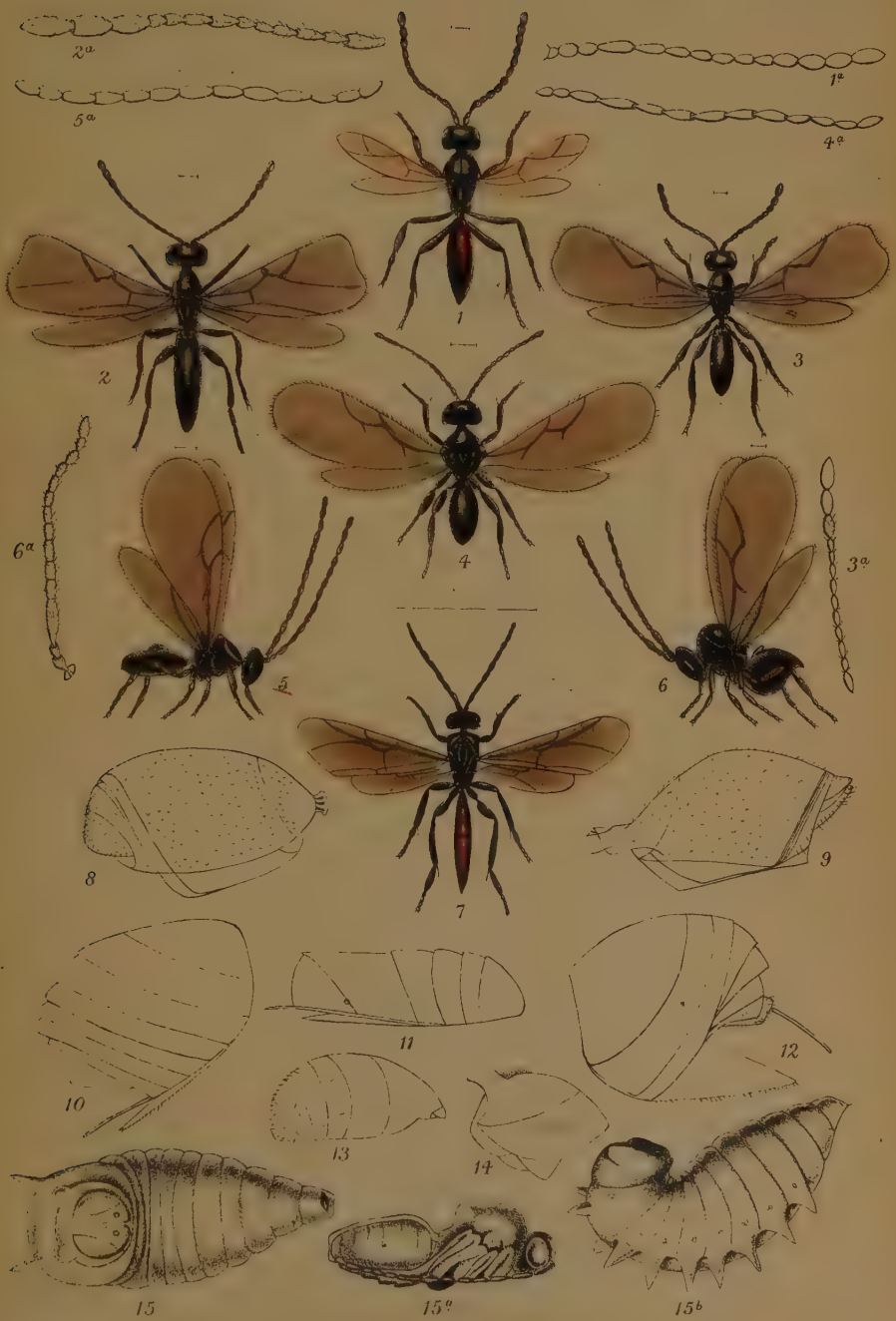

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PLATE XV.

Fig. 1.—*Allotria halteraia.*
Fig. 2.—*Allotria brachyptera.*
Fig. 3.—*Allotria pedestris.*
Fig. 4.—*Phænoglyphis xanthochroa.*
Fig. 5.—*Phænoglyphis forticornis.*
Fig. 6.—*Phænoglyphis salicis.*
Fig. 7.—*Allotria megaptera.*
Fig. 8.—*Allotria pleuralis.*
Fig. 9.—*Allotria ruficeps.*
Fig. 10.—*Allotria ruficollis.*

PLATE XVI.

Fig. 1.—*Allotria flavicornis.*
Fig. 2.—*Allotria victrix.*
Fig. 3.—*Allotria Tscheki.*
Fig. 4.—*Allotria circumscripta.*
Fig. 5.—*Allotria minuta.*
Fig. 6.—*Allotria longicornis.*
Fig. 7.—*Allotria ancylocera.*
Fig. 8.—*Allotria curvicornis.*
Fig. 9.—*Allotria dolichocera.*
Fig. 10.—*Allotria collina.*

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PLATE XVII.

Fig. 1.—*Allotria Mullensis.*
Fig. 2.—*Allotria caledonica.*
Fig. 3.—*Allotria piceomaculata.*
Fig. 4.—*Allotria nigriventris.*
Fig. 5.—*Allotria macrophadna.*
Fig. 6.—*Allotria maculicollis.*
Fig. 7.—*Allotria filicornis.*
Fig. 8.—*Allotria basimacula.*
Fig. 9.—*Allotria citripes.*
Fig. 10.—*Allotria Ullrichi.*